

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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TO OUR READERS.

The Supply of "FLIGHT." Important Notice.

Order "FLIGHT" to be either delivered or reserved for you regularly.

As the demand for "FLIGHT" is so great each week, it is of the utmost importance that readers should place their orders *firmly* for copies of "FLIGHT" at the bookstalls, their newsagents, or direct from the publishers, at 44, St. Martin's Lane, W.C., if they wish to secure a copy every week and avoid disappointment. The stringent Government restrictions in regard to the supply of printing paper necessitates this precaution in order that only actual numbers required are printed, and all wastage by unsold copies may thereby be reduced to a minimum, if not eliminated.

THE PUBLISHERS.

EDITORIAL COMMENT.



HIS morning, the regular day on which "FLIGHT" is available off the press, viz., Thursday, commenced the polling for East Herts Parliamentary vacancy, in which we have, a fortnight ago, predicted a possible successful result to Mr. Pemberton-Billing, who has had the hardihood—some folk designate it effrontery—to pit himself against the remorseless grinding-down political party machinery of the Coalition organisation. There are

several indications that the champion of British air supremacy has something more than a fighting chance in this very unequal struggle, and we sincerely hope that our note of interrogation in the side heading to this little article may next week have as its answer: "Yea verily, N. Pemberton-Billing, M.P." "P.-B." most assuredly deserves success, for he has, as far as such contests can be kept clean, endeavoured to fight fair and square above board, giving credit to the man who disputes with him the right of representing the Herts constituency in Parliament. We do not doubt but that the Coalition candidate is permeated with the same good intentions. But it is highly regrettable that what appear to be venomous attacks have been indulged in against the Air Defence candidate in some of the election literature which has been issued by somebody on the Coalition side. If it be necessary to resort to tactics of this sort, it would appear as if the arguments for support of the official candidate must be very weak indeed. Mr. Pemberton-Billing has justifiably taken exception to this attempt at hitting below the belt, regarding them as personal abuse, pure and simple, and has replied to them in effectual language. If "P.-B." loses, this his second effort, it will be by reason of the very wide area over which the voters are scattered and the weather conditions which have prevailed. It has been practically impossible to get into personal touch with a large number of these, who therefore are safe under the controlling influence of the party machinery. But it should be a close shave even

allowing for this handicap, as the continued attentions of the Zeppelin raiders, who have again got away with little to complain about, have left a distinct inclination to accept the undoubtedly sound arguments for a great and wide air policy for this country. Converts have been made on all sides, and the air candidate's colours and cards are seen in many a window where hitherto it would have been sacrilege to have suggested the inmate voting other than at the beck and call of the orthodox official. The attempt from the Unionist Central Office to "queer the pitch" of "P.-B." by denying a statement made by "P.-B." to the effect that he would be found by the U.C.O. a safe and comfortable seat in due course if he would refrain from active attack on the powers that be, was to say the least weak. The independent candidate's reply that, *Qui s'excuse, s'accuse*, was suggestive, and carries its own moral. Politics are supposed to be for the time being in abeyance—we hope dead for all time is the word; with these we are entirely unconcerned, and thank God for it. Why then bother about keeping out a man who has entirely abjured the same thing, and stands first and last for but one end, to help win the war a bit earlier by fighting for a really offensive air unit for the country. There are no politics in that campaign. Therefore it must be the attention which this claim for air supremacy, when persisted in by an air candidate in the House, would bring with it that is forcing the opposition to "P.-B.'s" election. If sent to the House for East Herts, a dietary of milk-and-water explanations will leave "P.-B." cold. His knowledge of his subject should carry conviction to the whole House, and the hands of both Air Services, and of the special Committee, should be enormously strengthened by the knowledge that at Westminster at last there is a representative who is able to speak authoritatively for air requirements and back up the demand which has gone forth from the country for the building up of the supremacy in the air of this country. Take by way of a sample of what may be expected from the Coalition candidate, in the event of it not suiting the Government to expand in this direction,

the following views of the "other side" candidate:—
"Our air service has been greatly neglected and starved, but it is useless at this time to rake up past errors, although I feel very strongly on this subject."

Great Scott, it's about time somebody supporting the Government did "feel very strongly" about it! There is not the slightest suggestion that Mr. Pemberton-Billing has any intention of upsetting the Coalition or bringing up political strife just now. His one and only desire is to hammer away until the Government are compelled to recognise the position as it is and move with a 20-inch gun vigour in pushing along the air business. So long as all the Coalition members are tongue-tied, nothing really stirring can be expected. But let there be evidence of a really strong hand guiding the House in air affairs, and a very different tune will be heard. If he or any other member who may get in upon the "air-ticket" fails in his duty to the cause, his Parliamentary career is not likely to be of long duration, and a more worthy representative would speedily replace him. But that a man—and a strong one at that—is required who is interested beyond the point of merely having a "watching brief," is a necessity in the interests of the air there can be no manner of doubt. From the few remarks, couched in a bantering style, of Lord Derby in the House of Lords last week upon his position as Chairman of the Special Air Services Co-ordination Committee, it would seem as if there are in this connection very great limitations to his powers and the scope for his abilities. This fact only emphasises the necessity for an independent man to take matters in hand. If everything that is possible is being done by the Government, well and good. If on the other hand there is, as we believe, room for very helpful expansion, under a generous view of the necessities of the case, then the Government, the Air Services, and the entire Empire will have reason to be glad that the agitation for air supremacy has borne first fruit, before it is once again declared to be "too late." Therefore we sincerely hope that before the end of this week, Aviation will have its own M.P., in P.-B., in our B.P.—initials are the vogue now—and may this reference to the subject be in time to turn a few waverers in the district whose votes may be the means of making a difference in favour of the Air candidate, however small that difference may be.

General Henderson and the Army Council.

WE welcome the appointment by the King of Major-Gen. Sir David Henderson, K.C.B., D.S.O., as a member of the Army Council. This is a further important move

The Roll of Honour.

The following casualties in the Expeditionary Force have been reported from General Headquarters to the War Office:—

Under date February 23rd:

Wounded.

and Class Air Mechanics S. E. Blackman, C. T. Campion, A. Cooper, W. E. Field, W. P. Mansbridge, H. H. Scruby, and L. C. Spinks.

Under date February 24th:

Wounded.

1st Class Air-Mechanic H. Briggs.

Under date February 25th:

Wounded.

Second Lieutenant J. C. Barraclough, Yorks Regt. and R.F.C.

forward for the Air Service, and puts literally and figuratively the seal to the status to which already air matters have risen in the Councils of the Empire. Our congratulations to General Henderson and to the Nation.

Under date February 29th:

Killed.

Second Lieutenant C. H. Stileman, Royal Fusiliers and R.F.C.

Wounded.

Second Lieutenant W. C. R. Bloomfield, Royal Flying Corps.
Second Lieutenant G. C. Mills, Royal Flying Corps.

Undated:

Killed.

Second Lieutenant A. E. C. Archer, E. Kent Regt. and R.F.C.

Previously reported Missing, now reported Prisoner of War.

Second Lieutenant L. J. Pearson, R.E. and R.F.C.

CANADIAN CONTINGENT.

Previously Unofficially reported Killed, now Officially reported Died.

Lieutenant C. V. G. Field, 4th Canadian Inf. Bn., attached R.F.C.

A "POPULAR" TYPE AEROPLANE DESIGN.

By C. M. POULSEN.

(Continued from page 176.)

IN our last issue the form of wiring plates to be employed in the bracing of the wings was suggested. This week the general constructional arrangement of the wings themselves is shown. On page 157 in our issue of February 24th, a sketch, approximately to scale, was published of the wing section. For the 5 ft. chord decided upon the placing of the spars was fixed at $9\frac{1}{2}$ ins. from the leading edge for the front spar, and 3 ft. $4\frac{1}{2}$ ins. for the rear spar. When making the calculations for area required it was decided to make the area of the two wings 250 sq. ft. As the chord is 5 ft., the mean span will therefore have to be about 25 ft. Of this the centre section of the wings has a length of 2 ft. $4\frac{1}{2}$ ins., determined by the spacing of the inner struts and by the length of the clips that join the ends of the wing spars to those of the centre section. Since it has been found both from experience and according to model experiments that it slightly increases the efficiency of a wing to have the ends raked, mainly, it is thought, because it minimises end losses, this form has been chosen although it slightly adds to the constructional difficulties. In order to make the construction of the end rib as easy as possible, the amount of raking given to the ends of the wings has been kept within reasonable limits, the difference in length of front and rear spars being only $5\frac{3}{4}$ ins.

The outer inter-plane struts are placed 7 ft. 8 ins. from the root of the wing, leaving an overhang of 3 ft. $8\frac{1}{4}$ ins. for the rear spar and 3 ft. $2\frac{1}{2}$ ins. for the front spar. In order to lighten the spars they are spindled to an "I" section, leaving them solid at the root and tip, and also at the points where the inter-plane struts are attached, and where consequently the spars have to be pierced by horizontal bolts. The depth of the spindling was given on the sectional drawings of the spars which appeared on page 158 of our February 24th issue. At the points where the struts occur a different form of rib will have to be employed, since the internal bracing wires of the wings are taken from here, and the rib at this point, therefore, will have to take the compression due to the bracing. For this purpose a variety of forms are employed, some designers using a solid rib, others preferring one of the box type. For our purpose the latter type will be chosen, since it has the advantage of lightness. It is shown in one of the perspective sketches that surround the plan view of the wings, and consists, as will be seen, of two ordinary ribs, covered at the top and bottom with strips of wood secured to the ribs by wood screws. In the perspective sketch is shown how the box rib is cut out to accommodate the wiring plate and bolt.

Another sketch shows one way of joining the front ends of the ribs to the leading edge. I do not suggest that this is the only way of doing it, but it is easy and one frequently employed. The webs and flanges of the rib abut against the leading edge, to which they are secured by a thin strip of metal, as, for instance, aluminium. In order to prevent the web of the ribs from sliding sideways along the leading edge a small wood block is tacked to the leading edge on each side of the rib.

Before proceeding to suggest a method of attaching the outer rib to the spars and leading edge, a few words regarding the rib itself may be of use to amateurs in aeroplane making. An ordinary rib cut a little longer on account of the outward slope might of course be

used, but the flat side of such a rib does not make a very neat wing tip. Another form is generally employed, either simply a steel tube bent to the desired curve or a thinner rib of a section similar to that of the leading edge of the wings. Everything considered, I think that the amateur will find it easier to make the latter form. The way in which this rib may be, and frequently is, joined to the outer ends of the spars and leading edge is shown in some of the sketches on the left. A simple and strong joint, which has the advantage of being easy to make, is the mortice joint, and this has, therefore, been chosen. The end of the leading edge is mortised into the front end of the rib and pegged, the corner being rounded off afterwards. The spars are mortised into the rib in a similar manner, and the joint further strengthened by the combined angle and wiring plate shown in the sketch. For the shape of the outer rib (as seen from the side), the curve of this can easily be obtained from one of the ordinary ribs by drawing a centre line equal distances from the top and bottom curves, and then simply cut out a rib of this curvature, taking care that the curve of the rib is such that its centre line, when put in place, will go through the horizontal centre lines of the leading edge, front spar, rear spar, and trailing edge.

When the fabric is stretched tightly over the framework of the wings it puts all the ribs in compression, and in order to prevent any tendency of the comparatively light and thin webs of the ribs from buckling, stringers running parallel with the spars are introduced. These, it will be seen from the drawings, are placed at regular intervals between the spars, and are let into the web of the ribs as shown in the perspective sketch in the top right-hand corner. A tack through the flanges of the rib prevents these from sliding along the stringers, and in addition a small wood block tacked to the stringer strengthens the joint.

The question of the construction of the *ailerons*, and the method of hinging them to the back spar, now has to be dealt with. For the leading edge of the *aileron* I suggest a small spar of the section shown in the illustration. The webs of the ribs are, of course, the rear portion of the ordinary ribs, and abut against the leading edge of the *aileron* in the same manner as do the wing ribs against the leading edge of the wings. The flanges pass over the top and bottom of the leading edge to which they are tacked. For the *aileron* hinge I suggest eye bolts placed at suitable intervals, and partly let into the leading edge as shown in one of the accompanying sketches. The reason for letting the eye bolts into the leading edge is that in this way no space is left between the back spar and the *aileron* through which air can escape.

At the inner end of the *aileron* a diagonal compression rib is placed as shown, the object of which is to take the strain set up by the tightening of the fabric covering and to prevent deformation of the *aileron*. Similar compression ribs are employed for the same purpose where shown in the plan view of the wings, and also at the point where is attached the *aileron* crank lever. Regarding the latter, which may be of a variety of shapes and constructions, I suggest a short—say 6 ins. long—wood lever, streamlined and having a recess cut in its lower end for the flange of the rib. It is secured to the leading edge and to the two diagonal compression ribs by thin steel



clips as indicated in the sketch. Whether to employ ailerons in the top plane only or in both planes is largely a matter of the peculiarities of the machine. Four ailerons, if they are of ordinary dimensions have, of course, the advantage of affording an ample margin of control, but, on the other hand, I have seen at least one biplane in which the area of these surfaces was so great that every time they were called into play the machine would drop perceptibly on account of the loss of sustaining surface presented by the ailerons when in their normal position. As our machine has a comparatively high centre of gravity, and may therefore be expected to be fairly sensitive to the lateral controls, I suggest having them in the top plane only. In this case, therefore, a cable

would pass from the crank lever on one side forward to a pulley on the front spar, across to another pulley on the other top plane, and hence to the corresponding crank lever on the other side. The operating cables would be taken from the under side of the aileron, over pulleys on the top of the lower wing and to the controls.

In the drawings the rear portion of the top plane centre section has been left in place. As a matter of fact this will probably have to be cut away in order to facilitate ingress and egress to and from the pilot's seat. Although not being very graceful in appearance, this may be done by simply cutting away the rear portion of the ribs up to the back spar.

(To be continued.)

The British Air Service

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

THE following appeared among the Admiralty announcements of the 29th ult. :—

R. H. Yeates, entered as Probationary Flight Sub-Lieutenant (temporary), with seniority of Feb. 9th, and appointed to "President," additional, for R.N.A.S.

The following appeared among the Admiralty announcements of the 2nd inst. :—

Squadron-Commander H. L. Woodcock, promoted to the rank of Wing-Commander, with acting rank of Commander, R.N., with seniority of Feb. 29th. H. S. Murton (late Sapper, Canadian Engineers), entered as Probationary Flight Sub-Lieutenant (temporary), with seniority of Feb. 11th, and appointed to "President," additional, for R.N.A.S. Temporary Sub-Lieutenant (R.N.V.R.), G. Whale, to "President," additional, for R.N.A.S., March 1st.

The following appeared among the Admiralty announcements of the 3rd inst. :—

Air-Mechanic (1st Grade) J. C. Atkinson, granted the temporary rank of Sub-Lieutenant (R.N.V.R.), with seniority of Feb. 29th, and appointed to "President," additional, for R.N.A.S. Temporary commissions as Lieutenant (R.N.V.R.) have been granted to Temporary Warrant Officer (Second Grade) G. D. Nelson and C. Birch, with seniority respectively of Feb. 29th and March 2nd, and both appointed to "President," additional, for R.N.A.S.

The following appeared among the Admiralty announcements of the 4th inst. :—

Flight-Commander J. W. K. Allsop (temporary), to "President," additional, for Air Department, Admiralty, March 3rd.

The following appeared among the Admiralty announcements of the 6th inst. :—

Surgeon E. L. Markham, M.B., to "President," additional, for R.N.A.S., March 4th. L. A. Powell, entered as Probationary Flight Sub-Lieutenant (temporary), with seniority of Feb. 22nd, and appointed to "President," for R.N.A.S.

The following have been granted temporary commissions as Lieutenants (R.N.V.R.), with seniority of March 4th, and all appointed to "President," additional for R.N.A.S. : E. P. Currall, W. R. Parsonage, J. W. Sharpus, E. H. Cockshott and J. Honey.

Royal Flying Corps (Military Wing).

THE following appeared in a supplement to the *London Gazette* issued on the 1st inst. :—

Equipment Officer.—Major George M. Griffith, R.A., from Deputy-Assistant-Quartermaster-General; Feb. 4th, 1916.

Memoranda.—To be Temporary Second Lieutenants for duty with the R.F.C. : Sergt. John Inwood, from 3rd Canadian Mounted Rifles; Feb. 7th, 1916. 1st Class Air-Mechanic Frank Reginald Hatch, from R.N.A.S.; Feb. 21st, 1916.

The following appeared in a supplement to the *London Gazette* issued on the 2nd inst. :—

Memoranda.—Sergt. H. M. E. Adie, from 19th Canadian Infantry Batt.; 1st Class Air-Mechanics William J. Cooper and John Wotherspoon Burt, from R.F.C.; Feb. 6th, 1916.

Squadron-Commanders and to be Temporary Majors whilst so

employed.—Feb. 16th, 1916: Capt. Charles Bovill, R.A., from a Staff Officer, R.F.C.; Capt. William F. MacNeece, Queen's Own (Royal West Kent Regt.), from a Flight-Commander.

Flight-Commander.—Temporary Lieut. G. A. Burney, Scottish Horse Yeomanry (T.F.), from a Flying Officer, and to be Temporary Captain whilst so employed; Jan. 18th, 1916.

Flying Officers.—The appointment of Capt. Maurice G. Lee, 40th Pathans, Indian Army, notified in the *Gazette* of Feb. 4th, 1916, is cancelled. Feb. 15th, 1916: Temporary Capt. J. T. Powell-Whittaker, A.S.C., and to be transferred to the General List; Temporary Lieut. E. H. Gibbon, R.E. (T.F.); Temporary Second Lieut. D. H. Gray, King's (Liverpool Regt.), and to be transferred to the General List; Temporary Second Lieut. J. E. H. Freeman, Queen's (Royal West Surrey Regt.), and to be transferred to the General List; Temporary Second Lieut. R. A. Pierpoint, Princess Charlotte of Wales's (Royal Berkshire Regt.), and to be transferred to the General List; Temporary Second Lieut. A. W. Keen, A.S.C., and to be transferred to the General List; Second Lieut. Stephen L. Pettit, Royal Fusiliers (City of London Regt.), Special Reserve, and to be seconded; Second Lieut. Robert J. Bevington, R.A., Special Reserve; Second Lieut. Royes P. Sherriff, Prince of Wales's (North Staffordshire Regt.), Special Reserve, and to be seconded. Second Lieut. J. C. Simpson, Special Reserve. Feb. 16th, 1916: Temporary Lieut. G. J. Jones, Lancashire Fusiliers, and to be transferred to the General List; Temporary Lieut. K. T. Doding, Queen's (Royal West Surrey Regt.) (T.F.); Second Lieut. Durham D. G. Hall, Alexandra, Princess of Wales's Own (Yorkshire Regt.), Special Reserve, and to be seconded. Feb. 17th, 1916: Capt. Maurice G. Lee, 40th Pathans, Indian Army; Temporary Lieut. P. G. Marr, A.C.C., and to be transferred to the General List; Second Lieut. Richard M. S. Shepherd, Royal Irish Regt., Special Reserve, and to be seconded; Temporary Second Lieut. W. S. Earle, General List; Temporary Second Lieut. W. L. Clark, Duke of Cambridge's Own (Middlesex Regt.), and to be transferred to the General List. Second Lieuts. (Special Reserve): D. Cushing, Morden M. Mowat, William A. Spratt, G. M. Murray, Hugh H. McL. Fraser, Cecil A. Lewis, and Cecil W. Blain.

Flying Officers (Observers).—Oct. 21st, 1915: Capt. George Henderson, 38th King George's Own Central India Horse, Indian Army; Temporary Capt. W. Milne, General List; Lieut. Robert G. H. Murray, 9th Guikha Rifles, Indian Army; Temporary Lieut. N. C. Sampson, General List; Lieut. George A. Parker, Northamptonshire Regt., and to be seconded; Lieut. John V. Steel, R.A., and to be seconded; Lieut. James G. Selby, R.A., and to be seconded; Lieut. Ian Macdonell, Lord Strathcona's Horse (Royal Canadians); Lieut. E. N. Clifton, Coldstream Guards, Special Reserve; Temporary Second Lieut. M. A. J. Orde, General List; Second Lieut. John E. Evans, Royal Welsh Fusiliers, and to be seconded; Temporary Second Lieut. C. Seedhouse, General List; Second Lieut. J. O. Andrews, Royal Scots (Latham Regt.) and to be seconded. Feb. 2nd, 1916: Second Lieut. B. E. Sutton, Westmorland and Cumberland Yeomanry (T.F.); Second Lieut. Arthur

W. F. Glenny, A.S.C., and to be seconded. Feb. 12th, 1916: Temporary Lieut. F. J. Roberts, A.S.C., and to be transferred to the General List. Second Lieut. H. Welch, R.F.A. (T.F.) Second Lieut. Norman N. Caton, R.F.A., Special Reserve. Temporary Second Lieut. H. D. W. Wilson, General List. Feb. 15th, 1916: Temporary Second Lieut. G. G. Boyton, General List. Temporary Second Lieut. N. L. Robertson, General List. Feb. 17th, 1916: Temporary Second Lieut. A. Duguid, R.A., and to be transferred to the General List. Second Lieut. E. W. Stubbs, King's (Liverpool Regt.) (T.F.), Temporary Second Lieut. G. Price, General List.

Assistant Equipment Officers.—Second Lieut. G. J. King, Prince of Wales's Own (W. Yorks Regt.) (T.F.); Dec. 6th, 1915. Feb. 15th, 1916: Temporary Capt. B. T. Monier-Williams, R.A., and to be transferred to the General List. Temporary Capt. E. A. Goodwin, Cheshire Regt., and to be transferred to the General List. Temporary Lieut. E. A. Jackson, King's Own (Yorks L.I.) (T.F.); Temporary Second Lieut. E. J. Howard, Bedfordshire Regt., and to be transferred to the General List. Second Lieut. (Special Reserve): Cornwall P. W. Jolliffe, Robert E. A. Daniel, John D. Troup, Hugh Phillips, Stanley A. Alder, Thomas L. Collins, John V. Read, Ernest L. Pegge, Reginald F. Howard, George F. Underwood, Reginald F. Tindall, William C. Stringer, and Felix C. Rowe.

Supplementary to Regular Corps.—Second Lieutenants (on probation) confirmed in their rank: D. Cushing, Morden M. Mowat, William A. Spratt, G. M. Murray, Hugh H. McL. Fraser, Cecil W. Blain, Cecil A. Lewis and George F. Underwood.

To be Second Lieutenants (on probation): Dillwyn P. Starr; Feb. 22nd, 1916. Feb. 23rd, 1916: Herman B. Prior, George D. Rae and Norman W. Morrison.

Adjutant-General and Quartermaster-General's Staff.
Deputy-Assistant Quartermaster-General.—Capt. (Temporary Major) Archibald Christie, R.A., from a Squadron-Commander, R.F.C., and to retain his temporary rank whilst so employed, vice Major G. M. Griffith, R.A.; Feb. 4th, 1916.

The following appeared in the *London Gazette* of the 3rd inst.:—**Flight-Commanders from Flying Officers and to be Temporary Captains whilst so Employed.**—Feb. 21st, 1916: Lieut. Robert Egerton, Princess Victoria's (Royal Irish Fusiliers); Second Lieut. William T. L. Allcock, Special Reserve.

Supplementary to Regular Corps.—Second Lieutenant (on probation) Richard Lionel Burdon-Sanderson is confirmed in his rank.

To be Second Lieutenants (on probation): Abdy H. G. Fellowes; Feb. 23rd, 1916. George R. McCubbin; Feb. 28th, 1916.

The following appeared in a supplement to the *London Gazette* issued on the 4th inst.:—

Flying Officers.—Feb. 19th, 1916: Second Lieut. E. M. L. Ainslie, Duke of Cambridge's Own (Middlesex Regt.) (T.F.); Second Lieut. Sturley P. Simpson, Bedfordshire Regt., and to be seconded; Second Lieut. Richard L. Burdon-Sanderson, Special Reserve.

Supplementary to Regular Corps.—To be Second Lieutenants (on probation): Charles Lambert; Jan. 26th, 1916. George G. Fiddes; Feb. 5th, 1916.

Royal Flying Corps (Territorial Force).

The following appeared in a supplement to the *London Gazette* issued on the 2nd inst.:—

Hampshire Aircraft Parks.—William J. Stutt to be Lieutenant (temporary); March 3rd, 1916. To be Second Lieutenants: March 3rd, 1916: George S. Wilkinson, Raymond S. Burch, and Arnold A. Maxwell.

THE "X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of aircraft raids to be published, we are, as before, giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

The following announcement has been officially issued:—

"X 21" Raid.

"War Office, March 1st, 10 p.m."

"A German seaplane passed over a portion of the South-East Coast of England between 6.15 p.m. and 6.25 p.m. this evening and dropped several bombs.

"No military damage was done. A child nine months old is reported to have been killed."

"Admiralty, March 3rd."

"The French authorities at Dunkirk report that a German seaplane was picked up at 10 a.m. yesterday, three miles north of Middlekerke Bank.

"It had come down at 9 p.m. on Wednesday when returning from England. One of the observers was drowned, and the other picked up and made prisoner."

"X 22" Raid.

"War Office, 12.40 a.m., March 6th."

"A Zeppelin raid took place last night, when two hostile airships crossed over the North-East Coast. At the time of this report their movements have not been clearly defined. Some bombs were dropped, which fell in the sea, near the shore, but information is not yet available as to whether any damage has been done on land.

"A further *communiqué* will be issued later."

"War Office, March 6th."

"The number of Zeppelins which took part in last night's raid is now believed to have been three. After crossing the coast, the airships took various courses, and, from the devious nature of their flight, were apparently uncertain as to their bearings. The area visited included—

Yorkshire.	Huntingdon.	Essex, and
Lincolnshire.	Cambridge-hire.	Kent.
Rutland.	Norfolk.	

"As far as is known, about forty bombs were dropped altogether. The casualties so far ascertained amount to—

KILLED.	INJURED.
3 men.	33
4 women.	
5 children.	

"The material damage was: Two terraces of houses practically destroyed, one office, one public-house, a café, and several shops partly destroyed, and a block of almshouses badly damaged."

"War Office, March 7th."

"It has now been ascertained that ninety bombs were dropped by the enemy airships during the raid of March 5th-6th.

"Bombs appear to have been dropped indiscriminately over rural districts. This may be due to the fact that owing to the rough weather the Zeppelins were uncertain as to their whereabouts, and were anxious to get rid of their bombs before escaping under cover of night.

"No military damage of any description was caused.

"The casualties were entirely confined to the civilian population, and of those previously reported as injured one has since died in a village in Lincolnshire, bringing the total killed to thirteen."

German Version.

"Berlin, March 6th."

"During the night of March 5th-6th, some of our naval airships raided the naval *point d'appui* of Hull-upon-Humber and the docks, dropping a great many bombs. Their success was ascertained. The airships were violently fired upon, but in vain, and all returned."

Other Raid Gleanings.

OVER a Yorkshire town where most of the damage was done a Zeppelin hovered for an hour; about thirty bombs, mostly high-explosive, were dropped.

After releasing about a dozen bombs the raider disappeared for twenty minutes; on leaving the district a few minutes after 1 a.m., several bombs were dropped in rapid succession.

One bomb demolished a cottage, killing a mother and four children, and severely injuring the father.

The stained glass windows of the parish church were shattered.

A hole 8 ft. deep was made by one bomb in the cinder track at a college.

Snow fell heavily before and after the raid.

Only three fires were caused in the district, and none were of a serious character.

In another Yorkshire town the only material damage was the breaking of a large number of windows.

In one area four deaths from excitement are reported.

A Zeppelin was seen over Cambridgeshire following an erratic course, as if it had lost its bearings.

The engines of two Zeppelins were heard in Lincolnshire. The airships passed out to sea at an interval of 15 mins. Several incendiary bombs were dropped into grass fields.

A RAIDER was heard over the Essex coast, but no bombs were dropped; the airship was apparently going in the direction of Kent.

A ZEPPELIN was seen over the north-east Kent coast at a height estimated at 9,000 ft.

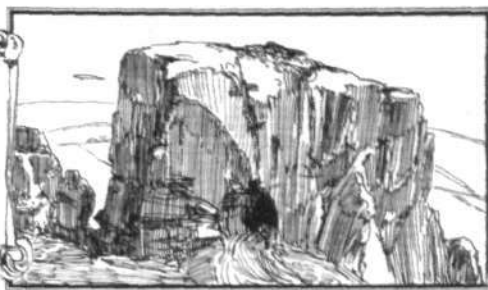
A FEW miles from an East Coast town four bombs were dropped, all on vacant land, and the only damage done was a couple of railway lines twisted.

THE two Zeppelins were fired at, and, it is believed, one was hit. They disappeared over the sea.



NATURE'S AIRSHIP HARBOURS

*As envisioned by
J.P. and V.E.T.*



NAVIGATION of the air gives promise of bringing about in the not far-distant years great changes in our lives. The last twelvemonth or more has brought this fact more clearly into relief than ever before. There were a few in the near past who pictured in aircraft the vehicles of the future—our commerce would be transported by air; we would travel, near or far, for business or pleasure, by the same method; the military aspect would, of course, also develop prodigiously. It was a fantastic dream—at least, so they were told by the majority, who only saw in the aeroplane and airship dangerous, albeit wonderful, inventions having little, if any, practical value. Now, however, in view of the extraordinarily rapid progress aviation has made and the vast amount of knowledge as regards its application which this terrible war has taught us, we can ask ourselves the question, "Is the time so far distant when the above 'dream' of general development will really and truly be realised?" There are still many—in fact, the majority—who will say "It will never come," but they are wrong. The science and application of aviation is going to develop to immense proportions, as has been the case with shipping and railways. At some not very distant date aerial navigation will be of equal importance as the existing means of transport, by land and sea, if indeed it does not supplant these means altogether in some respects. This especially applies in the case of undeveloped countries where railways and roads are few and far between. Whether it will be the airship or the aeroplane that will take the more prominent part is, perhaps open to argument, and although it is our opinion that the former will develop into a vessel of as much importance as the latter, for the moment this is a matter outside the question under consideration. It can be assumed with certainty, however, that the airship is not going to be out of it altogether.

It is almost impossible to anticipate the design of the future aeroplane, for this involves so many problems outside the scope of this article. We may certainly predict, however, that the future aeroplane will be much larger and far more powerful than it is to-day. With the airship, however, the problem of anticipating its future character is somewhat more simple. It will, in all probability, be in nearly every case of the rigid type, and will in general construction follow the forms well known to-day, but on a much larger scale, and with more powerful and efficient engines. The general streamline form, approaching even to-day to great perfection, will probably be modified but slightly, whilst great improvement will be made in the construction, and in the use of an entirely weather-proof covering. It is in connection with the airship, therefore, we propose to put forward most of our suggestions. Inasmuch as the purpose of this article is not to prophesy the future design of dirigibles, it must be taken for granted that the airship has developed along the lines indicated. The main proposition is:—What changes will be required to meet this swift growth of aerial navigation, or what adjustment will be needed of the present conditions, and

what modifications will it produce on economic life in various countries? Just as this war means not only political but also social reorganisation of Europe, even so the rapid development of flying from the theoretical and experimental stages to the practical application for commerce, transport, and war must revolutionise the present economic conditions.

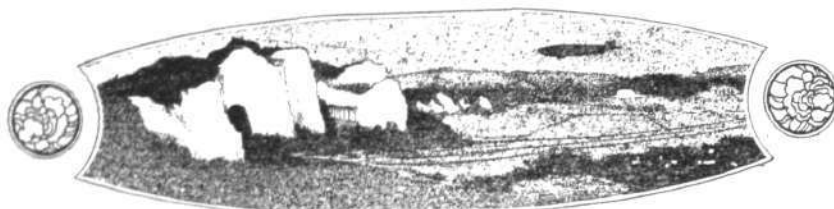
Imagine thousands of these aerial liners, tramps, &c., in being; imagine their huge, elongated bodies soaring in the air, casting shadows on all parts of the globe; carrying merchandise and passengers. This is not a vain imagining, for such will assuredly be the condition of a not distant to-morrow. What will be the principal need of this huge aerial fleet? The problem will be: Where and how to house these huge airships, that like the largest liners will still be somewhat frail craft needing a careful handling and some permanent protection from storms, gales, &c. The present-day sheds for airships, however ingenious—and the war has brought them to a state of great perfection—are still far from being a satisfactory solution of this problem. Obviously, in the future the larger and ever-growing fleet of airships would demand larger and still larger and increasingly numerous steel sheds. Eventually the erection of such permanent sheds, strong enough against wind and storm, and safe also against attacks from the air, would present as difficult a problem as the construction of the airships themselves, if not more so.

It is at this point that man will, most probably, turn to nature in quest of natural harbours for his flying ships. Indeed, the wonderful cliffs, steep rocks, and many other geological formations provide most appropriately means to this end. There are others, like disused quarries, that are already fashioned by human agency for this purpose. With all these it will only be necessary to excavate some, or construct roofing over others, or bore recesses; in short, to adapt the favourable natural or semi-natural conditions as harbours for our airships, on very similar lines as the harbours for sea ships were chosen and built. As the outer covering of the future airship will probably more and more approach being weather-proof, it will not be necessary in every instance to provide fully enclosed shelters; it will be sufficient to erect safe landing places protected as much as possible from wind and weather. The question of cost may here be put forward as an argument against this scheme, but it must be remembered that, whatever the cost may be, it will decidedly be of secondary consideration, once the necessity arises for the erection of permanent harbours for airships, and that cost did not prevent the enormous outlay for harbours as ships grew and grew to their present great tonnage and draught.

This, then, is the proposition in brief, and we must, for the time being, at any rate, bring it to a close, for we have already taken up much valuable space in this issue of "FLIGHT." Perhaps, however, the Editor—having regard to the airship housing difficulties referred to by the First Lord of the Admiralty on Tuesday—will give us shortly the opportunity of putting forward further par-

ticalars of this scheme, for there are many interesting problems and details to be considered, such as the cost of construction, using as a guide the experiences gained in similar engineering enterprises; the various modifications conditioned by given natural formations; also the many and various subsidiary devices forming the full equipment of such harbours. Further, as it is not certain, nor likely, that even this devastating war will be the last—much as many

of us would devoutly wish it to be so—these future aircraft harbours will have to be efficiently defended; this point will also have to be carefully considered. Lastly, the changes that the building of these permanent harbours would bring about in deflecting and modifying the existing commercial routes and trade centres, and thus disturbing in all countries the present economic conditions, open an intensely interesting, if somewhat speculative, argument.



ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS.

Annual General Meeting.
THE Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Tuesday, March 28th, 1916, at Piccadilly, London, W.

Committee.
In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the Committee are:—

Lieut.-Col. R. K. Bagnall-Wild, R.E.
Lieut.-Col. W. D. Beatty, R.E.
C. B. Cockburn.
Lieut.-Col. F. Lindsay Lloyd.
Capt. J. T. C. Moore-Brabazon, R.F.C.
Com. C. R. Samson, R.N., D.S.O.
A. Mortimer Singer.
T. O. M. Sopwith.
The Marquess of Tullibardine, M.V.O., D.S.O., M.P.

Any two Members of the Club can nominate a Member to serve on the Committee, provided the consent of the Member has been previously obtained. The name of the Member thus nominated, with the names of his proposer and seconder, must be sent in writing to the Secretary not less than fourteen days before the Annual General Meeting. The last day for the receipt of nominations is Tuesday, March 15th, 1916.

Extension of the Hours of Opening the Club.

The Club is now open from 9 a.m. to 10.30 p.m. each day, including Sunday.

THE FLYING SERVICES FUND

administered by

THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers, and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 166, Piccadilly, London, W.

Subscriptions.

	£	s.	d.
Total subscriptions received to Feb. 29th, 1916	10,569	3	0
Collected at the Westland Aircraft Works, Yeovil (Twenty-second contribution) ...	0	6	4
Royal Naval Air Service Sports and Football Club, Felixstowe ...	8	16	9
Collected at the Westland Aircraft Works, Yeovil (Twenty-third contribution) ...	0	7	9

Total, March 7th, 1916 ... 10,578 13 10

B. STEVENSON, Assistant Secretary.
166, Piccadilly, W.

FROM THE BRITISH FLYING GROUNDS.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School (R.N.A.S.).—Straights with instructor last week: Probationary Flight Sub-Lieuts. Donald, Griffin, How, Maxted, Melhado and McHardy. Circuits with instructor: Probationary Flight Sub-Lieuts. Carr, Gibbs, West and Wigglesworth.

Brevets during week: Probationary Flight Sub-Lieuts. Aitkin, Evans, Jones, Kingsford, Rees and Templeton.

Grahame-White Civilian School.—Straights with instructor: Messrs. Tanner, Baragar, Box, Hathaway, Hillaby, Holman, Sandys, Rigby, Sloden, Smith, Williams, S., and Matthews. Circuits with instructor: Messrs. Franck, Kryn, Phillipi, Walk, Butler, Eichelbrenner, Grasset and Leigh.

Brevet during week: Mr. Vergult.

Instructors during week: Messrs. Biard, Hale, Manton, Pashley, Russell and Winter.

Beatty School.—The following pupils were out during last week: Messrs. Thompson, Wainwright, Baker, d'Allesina, Jaquin, Liu, Monhom, Chang, Nan, Fong,

Brand, Collier, Edwards, Samter, Barrow, Branford, Mossop, Patterson, Sellars, Parsons, Tow, Halford-Thompson, Hungwan, Phillips, Podmore, Brewerton, Stanley, Yam, Tzeping and Ping.

The instructors were Messrs. G. W. Beatty, W. Rochekelly, G. Virgilio, R. W. Kenworthy, L. L. King, A. E. Mitchell and H. Fawcett, the machines in use being Beatty-Wright dual control and single-seater propeller biplanes and Caudron tractor biplanes.

Certificates were taken during the week by Messrs. S. Willmet and J. C. Burney-Cumming, both of whom made very good flights and landings.

Hall School.—The following pupils were out last week:—With A. Chave: Messrs. Longton, Mahoney, Duncan, Collier, Rand, Le Grice, Warwick, Osmond and Halliday. With C. M. Hill and J. Drew: Messrs. Robert, Smith (2), Rochford, Neal, Millburn, Chapman, Arnsby, Ormerod, Smith (1), Wooley, Lieut. Cook, Dodd, Thom, Collins, Taylor, and Osmond.

Machines in use: Hall Government type tractors.

London and Provincial Aviation Co.—Pupils doing rolling last week: Messrs. Archer, Aldous, Dawson, Hay and Houba. Doing straights: Messrs. Brown, Moore and Scott. Circuits and eights: Messrs. Clement, Ledure, Palethorpe and Vertongen.

Instructors: Messrs. W. T. Warren, M. G. Smiles, C. M. Jacques, H. Sykes and W. T. Warren, jun.

Royal Aero Club certificates were taken by Messrs. Ledure, Palethorpe and Vertongen.

Ruffy-Baumann School.—Straights or rolling alone last week: Messrs. Laidlaw, Cuthbertson and D'Opstael. Eights or circuits alone: Messrs. Thomson and D'Opstael.

Instructors: Edward Baumann, Felix Ruffy, Ami Baumann and Clarence Winchester. 50 and 60 h.p. Ruffy-Baumann and Caudron-type tractor biplanes in use.

Certificate taken during the week by Mr. A. Thomsen, who passed his tests in very good style.

Although the weather was far from ideal, a good deal of instruction has been accomplished as well as a certain amount of engineering and constructional work.

Bournemouth School.

Pupils doing rolling last week: Messrs. Morley, W. Mouton, G. Mouton, O. Wilson, J. Wilson, Morris and Adamson. Straights alone: Messrs. Dubois, Meeus, H. Smith and Devos. Half-circuits alone: Messrs. Simpson and Bonnevie.

Instructors for the week: Messrs. F. King, J. G. Woodley, and S. Summerfield.

35 h.p., 45 h.p. and 60 h.p. Caudron-type machines in use.

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SOME AMERICAN AERO ENGINES.

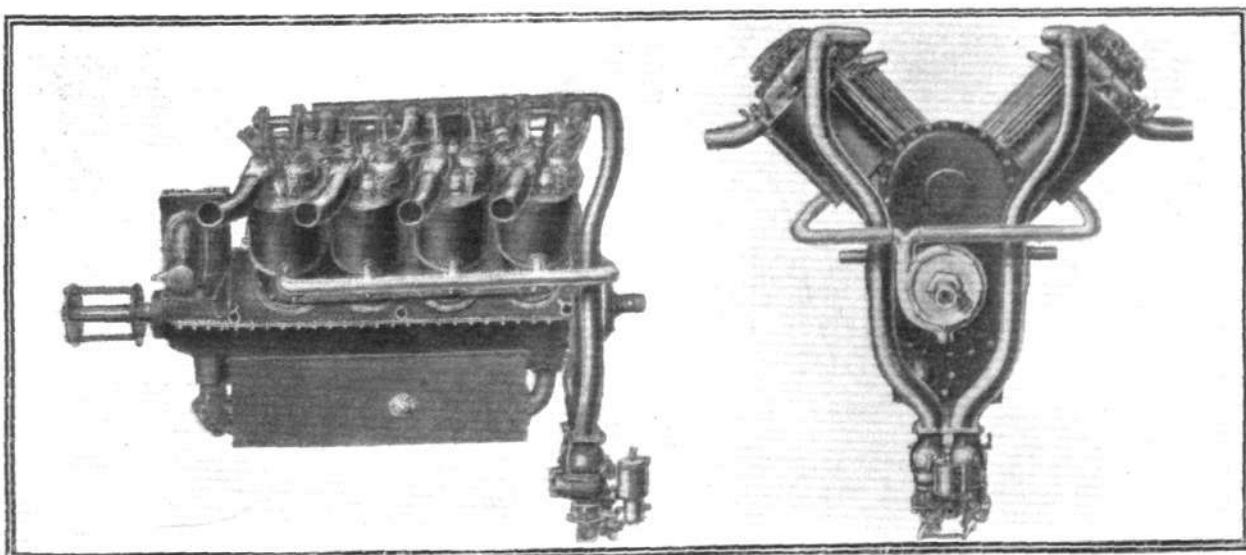
THE VAN BLERCK.

ONE of the latest aero engines to be placed on the American market is that manufactured by the Van Blerck Motor Co., of Monroe, Michigan. The Van Blerck "all-steel" motors are made in two models, an eight-cylinder and a twelve-cylinder. Both have a bore and a stroke of $4\frac{1}{2}$ ins. and $5\frac{1}{2}$ ins. respectively, and differ only in the number of cylinders employed. The cylinders are arranged V-form at 90° , and have the valves in the head situated fore and aft. No aluminium or aluminium alloy is used in the construction of these motors, steel being employed practically throughout. High grade machine steel is employed for the cylinders, which are cut from the solid billet, and accurately ground to size. The water jackets are of a special non-corrosive metal, and are, we believe, brazed on to the cylinders. The pistons, which are of cast-iron, are very accurately machined and ground to an exact fit, and carefully balanced. Concentric semi-steel piston rings of special design are fitted. Both inlet and exhaust valves are mechanically operated from a single camshaft through adjustable tappet rods and rocker arms. The valve springs are of the "rat-trap" type.

The crankcase is made of steel and high-grade stamping metal, and is horizontally divided. Contained within, but quite separate from, the crankcase is an oil reservoir having a capacity of about five hours' running. Perhaps

the angle at which the engine may be during flight. Each pump is practically two in one, one side of each pump driving oil through the hollow crankshaft to all the bearings, whilst the other side of each pump returns the surplus oil from the crankcase back to the reservoir. In this way it is practically impossible to flood the engine with oil no matter what the angle of flight may be. An instrument, mounted in view of the pilot, is provided which shows at all times the amount of oil in the reservoir. There is also a pressure gauge similarly mounted for indicating the oil pressure.

The connecting rods are tubular in section, and are of chrome nickel steel. The crankshaft is also made of chrome nickel steel. It is machined all over and carefully balanced, and is, of course, drilled. All the bearings are of high grade babbitt, and are easily replaced. The upper bearings in the crank case, which are of the bronze babbitt-lined type, are interchangeable, whilst the main bearing cap is poured with babbitt directly into the cap, a new cap being used when renewing. The camshaft is of steel with the cams forged integral with the shaft and case-hardened. A high-tension two-spark magneto, driven off the crankshaft, is employed, and the two plugs are located in the cylinder head, one on either side of the valves. The



one of the most interesting features of the Van Blerck engine is the system of lubrication employed. It is a high-pressure system throughout, two powerful gear pumps, one situated at each end of the crankcase, feeding the bearings with a constant pressure of oil regardless of

water circulating pump, centrifugal type, is driven off the opposite end of the crankshaft.

The normal engine speed is 1,400 r.p.m., and the h.p. developed at this speed is 124 h.p. and 185 h.p. for the two models respectively, giving a weight of $3\frac{1}{2}$ lbs. per h.p.



Early Rising.

A PILOT friend of mine has asked me to write something about early rising. To-night there is a fall of drizzling rain and snow, and as with the curtains drawn I sit in the old chair before a cheering fire, with a glass containing something which is not cocoa, I find it one of the hardest things imaginable to get up enthusiasm about.

Pilots have to rise early in the morning. I do not know this from first-hand evidence, because I have never yet seen one making for the aerodrome in the chilly hours of the dawn, but I believe that it is so. It appears that they have to rise from their downy bed as the sun creeps into the eastern sky. I have done this myself, and have thought nothing of it, but that has always been in the winter time. I long since saw the futility of pitting myself against nature in the early rising stakes. No matter how early I got up one morning, the sun would always go a few minutes better the next day, until I could see that unless I gave in and gave it best, I should be in danger of getting up the day before.

Early rising is with some people, I understand, a habit. I have known men who have told me that they could not possibly stay in bed after five o'clock in the morning, winter or summer—I should not call it a habit, but a disease. A man who gets up before the milkman, and calls it a habit, ought to see a specialist. I came near having the disease myself once, in my young and innocent days, when, because at 14 years of age I only turned the scale at four stone, I had dreams of winning the Derby, the Oaks, and a few other insignificant trifles in the racing world, all in one year.

A couple of winters on Newmarket Heath, where we had to turn out with the horses in the pitch dark at six o'clock in the morning for walking exercise, and were not allowed to wear a top coat, nipped in the bud any germs of the early rising variety which may have thought me virgin soil. A big swinging bell hung in the passage outside our dormitories, which used to ring every morning at five-thirty. The trainer could lie in bed and pull the cord summoning us to go out and shiver, whilst he turned over for another snooze. I don't think trainers are human. I am quite sure swinging bells are diabolical. If I dreamed I heard a swinging bell go off at five-thirty in the morning now, I should get right down under the clothes and scream for mercy.

I think some German specialist in frightfulness must have been a pupil at Newmarket in his youth, for he has invented an alarum clock which goes off six times, with intervals of two minutes. I bought one in London a short time ago, wishing, now the summer is coming on, to rise early enough to catch the nine-thirty. The man in the shop wound it up just to show me how it went. I did not know when I bought it that it was a German clock, or I would have had none of it. It discovered itself in the train going home. I live on a suburban line with more stations than line. The stations are

two minutes apart, and the clock fires off at the same intervals. Placed on the rack it started business promptly at the first stop, and kept time at the following stations equal to a fifty-guinea chronometer. If any pilot finds it difficult to get up in the morning, I can recommend one of these clocks—you've either got to get up, shy a boot at it, or have an epileptic fit once it starts business.

Look at early rising which way you like, there is no doubt it is an unnatural thing forced upon some men by the nature of their calling, and pilots seem to be in the swim. I know it is necessary in these strenuous times, when new pilots are so badly wanted, that the instructor should make use of every available minute of daylight from dawn to dark, but the hardship of their calling is not lost upon me as I sit up in bed with an early cup of tea, wondering whether my clothes would go on over my 'jamas, or MUST I take them off and face that cold bath, where I get so mixed up in the taps at this time of the year that I always turn the wrong one.

Every pilot instructor ought to have medals and gold braid and a cocked hat and five thousand a year. I would make any one of them a present of my clock, only it has gone out of business as a clock owing to spontaneous combustion or something; anyway it got severely handled, and is now doing business as a toy crane pulling up empty cotton reels on a piece of thread, and I think it is much better employed that way than disturbing respectable citizens at unnatural hours in the morning.

I can never make out why makers of alarum clocks cannot have some thought for the feelings of people, and make a clock which shall be amenable to reason. I know that when I wind it up at night I want it to go off at the time I set it for, and I have every determination to rise at its calling, but if in the morning I have altered my mind, why, in the name of all that's nameable, can't it leave off when told to? Any ordinary alarum clock will give in after kicking up a ditther for a couple of minutes if there is no response from the region of the under-eiderdown, but this beast used to come again and again without remorse until something had to be done, and in this case it was the clock.

Once, of my own free will, I got up every morning at four o'clock for a whole month, and have never regretted it. It was at Salisbury in 1912, on the occasion of the military trials, which I look upon as the starting point, the REAL starting point, of our present-day Air Services. I am afraid the trials did not do much in the matter for which they were organised, but they aroused interest in that which has now become of supreme importance, and as a side-issue supplied any amount of most useful information and data. And I am sure every pilot instructor saying naughty things to himself as he gently closes his street door, what time the cold grey creeps into the morning sky, feels, deep down in his heart, a pleasure at the thought that he is doing his bit for the old country. It is unconscionably cold, but a brisk walk pulls him together, and all is well.



AIRSHIPS



By R. P. HEARNE.

A QUESTION of more than passing interest to us is what load of bombs a Zeppelin can carry. The matter is best treated by an enquiry into the useful load capacity of the Zeppelin, for it is obvious that one factor governs the other. Going back to the 1913 type of Zeppelin, we have data to show that the average useful load capacity was in the region of one-fourth the total lift. That is, if the gas volume of the vessel gave a total lift of 20 tons, the useful load was about 5 tons, after allowing for the engines and all fixed equipment.

Zeppelin Load Capacity.

This useful load might be apportioned thus: Crew, 1 ton; fuel, $1\frac{1}{2}$ tons; ballast, $1\frac{1}{2}$ tons; ammunition, 1 ton; total, 5 tons, or one-fourth total lift.

Obviously many changes could be rung on these proportions. For short raids the fuel load and the crew could be reduced, and the bomb load increased. Ordinary ballast, too, might be replaced to a considerable extent by ammunition, and on various raids bombs, in which the firing-pin has not been released, have actually been thrown overboard for this purpose.

Zeppelin Efficiency Ratio.

Reverting now to the ratio of useful load, to total lift, it is not difficult to demonstrate that in the later ships a much higher ratio must have been arrived at. In the first place, gas capacity has been increased, thus giving a greater total lift. Zeppelins have now passed the 1,000,000 cubic feet gas capacity, and the gross lift is about 30 tons for the latest naval ships. On the old ratio this would give a net lift of $7\frac{1}{2}$ tons, and the extra gain of $2\frac{1}{2}$ tons would be applied for increasing the fuel load and the bomb load. A bigger crew would also be required.

But this useful load of $7\frac{1}{2}$ tons will not satisfy the requirements of a ship which makes long distance raids at high speeds, and at the same time can take a big load of ammunition to great heights. The more powerful engines call for a greater consumption of fuel, and to reach altitudes of over 5,000 ft. the ship must have ample capacity for ballast, as in order to rise vertically in the manner of a balloon a Zeppelin must reduce its weight.

Climbing Power.

The only other way to attain a good height is to climb by engine power, and this entails additional consumption of fuel. It is undoubted that the naval Zeppelin raiders attacking England have been able to attain great altitudes, and this could only be possible by increased efficiency. From various calculations I have arrived at the conclusion that the new Zeppelins have an efficiency ratio of about one-third as compared with the old ratio of one-fourth. That is to say, the latest 30-ton naval Zeppelin has a useful load capacity of 10 tons. This load will be allocated to crew, fuel, ballast and bombs on a sliding scale which depends on the nature and extent of each raid.

The Ammunition Load.

But it looks as if the latest type Zeppelins could upon occasion take nearly four tons of war material, and from this we must allow that it is most unwholesome to have Zeppelins hovering over this country at night. The greater the bomb load capacity the greater is the risk of even some chance projectile hitting a place where appalling loss of life might be occasioned.

Increased Accuracy of Attack.

To assume that there will be a great degree of inaccuracy always in aerial attack upon us is to live in a fool's paradise. No doubt our gun defence will continue to improve, and its direct effect will be to force airships to navigate at higher altitudes, as long as they rely upon bomb dropping. But we must bear in mind the possibility of aerial torpedoes and shell-throwing guns being carried on aerial vessels, and then an airship may remain four or five miles away from the town it is attacking, and pour in a destructive fire whilst it is out of the range and out of sight of the inner defences of the town.

I will return to this theme at another time, for I am concerned now with the size of Zeppelins, and the bearing this matter has upon developments in aerial warfare.

At the same time we must not be carried away with the idea that airships (or aeroplanes, for that matter) can be easily and rapidly magnified beyond the dimensions now current. In the abstract, we look rather hastily for developments in size, but experience shows that increased efficiency is more important, and until this high efficiency is attained any great increase in dimensions is dangerous. At all events, when we start building rigid airships I hope we shall not set out to excel the Zeppelins in dimensions merely.

Smaller Ships.

The lessons of the war will possibly tend to keep down the size of the Zeppelins, and make for higher efficiency rather than for increased length or girth. There is much to be said for a medium-sized airship of an improved design in which high speed is attainable. Of course, with an airship, to get the necessary initial lifting power we must have a reasonable volume of gas; and the tiny airship stands condemned for military uses, as it has not the requisite lifting power, and consequently cannot take up a powerful engine, and adequate supplies of fuel and ammunition.

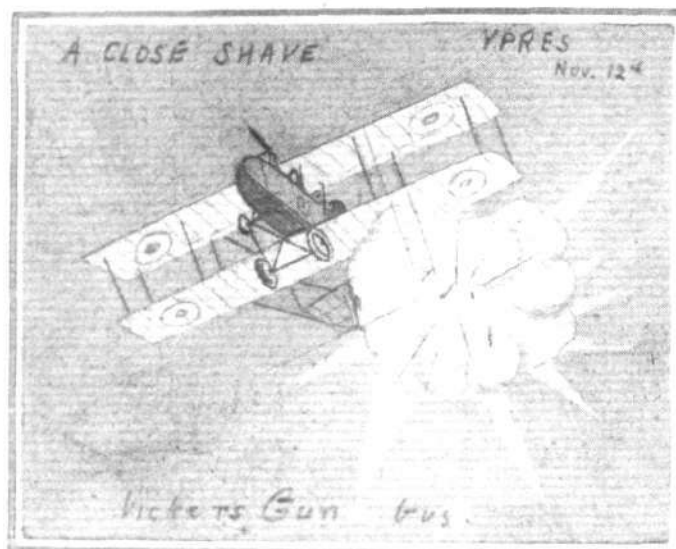
Nevertheless, a better design of rigid airship would give us a super-Zeppelin which in speed and climbing power would far excel the German ships. There are many basic crudities about the Zeppelin, and I am sure, that if we had British builders of rigid airships working on a proper understanding with the Government, we could soon excel the Germans in this branch of engineering. All we need is a healthy and well-established industry for the manufacture of airships. Given the facilities to produce, and we need not fear about the articles produced.



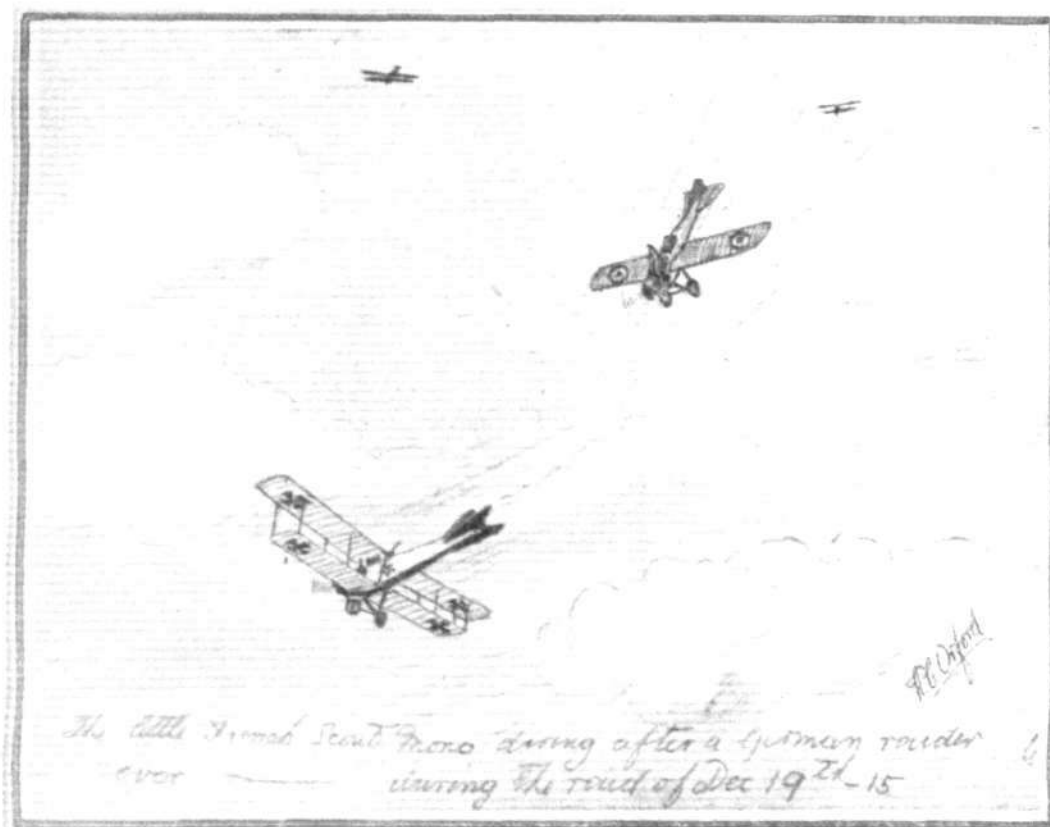
FROM Gunner W. C. Orford, R.F.A., come a trio of sketches of incidents in "the day's work" at the front. For trench sketching, these impressions of one of our artillery men, of what air-scraping looks like to the man down below, have a considerable amount of interest. Moreover they exhibit a distinct gift for drawing, for an eye to accuracy of detail, upon which we congratulate the artist. In describing the fights the artist's pen-picture is as follows:—

"The first hint I had of it was a terrific explosion, which made the very ground shake. I rushed out, and saw the sky fairly full of machines. They came up at about 9,000 or 10,000 feet, and as far as I could tell from their altitude consisted of Albatroses and Aviatiks. No sooner were they over the town than they were engaged by our 'buses. Two little scouts hurried at them like hawks on a flock of pigeons. The sight after that baffles description; the sky was full of whirling, banking and diving machines, and every now and then the terrific, boastful krup of the bombs. Away in the distance a little speck came rushing through the air, well above the clouds. It developed into a small monoplane, either a Dep or a Morane monocoque. When well above the Boches it picked out its 'bus (a big Albatros), and dived perpendicularly at him. A more dramatic dive I cannot imagine. For 500 ft. he hurled down, and when almost on the Albatros he was spotted. With that peculiar accelerating

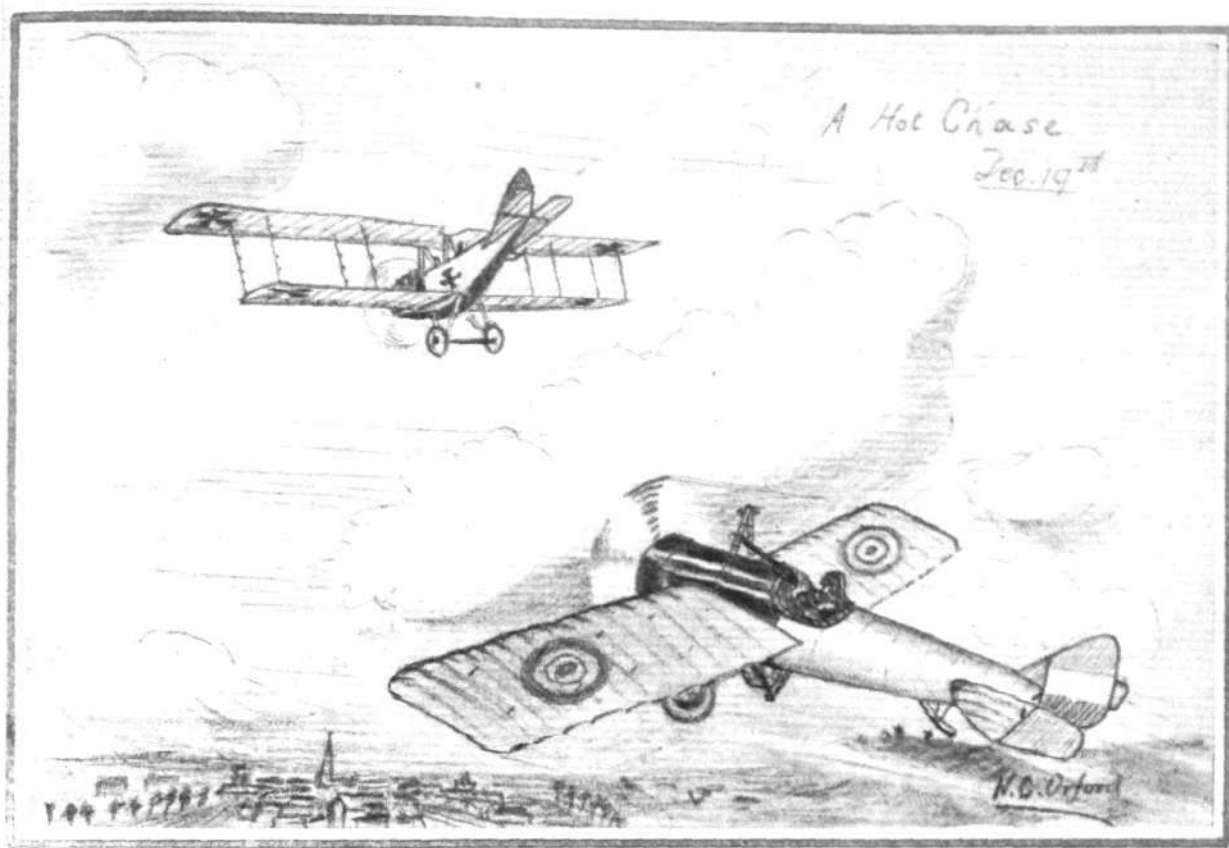
power of most German 'buses he was away. After him went the little 'bus. Around in acute spirals, left and right, diving, climbing, but always with the little 'bus hard



A close shave in the air by a Vickers gun 'bus near Ypres on November 12th, as visualised by the man on the ground. From an original sketch by Gunner W. C. Orford, R.F.A.



A sketch from the Front, by Gunner W. C. Orford, R.F.A., of an incident which he witnessed on December 19th last and referred to in the text on this page.



Another incident of air warfare on December 19th depicted by Gunner Orford, R.F.A.

after him, the German pilot did all he could to shake him off, all the time their machine-guns rattling away. Then, horrors! the little 'bus dived with startling suddenness. For some 3,000 ft. she performed a sickening spiral dive, with clouds of exhaust pouring out of her. Then when about 2,000 ft. up she gradually flattened out, and finished in a long glide towards the 'drome. While she was chasing the Albatros it was all the world like two sparrows chasing each other for a piece of bread. The other machines were still circling over the town. Every cloud seemed to hide a 'bus; then hiss, bang came the bombs. It was impossible to tell friend from foe in the dodging swarm. After being over the town about fifteen minutes they turned back to face the Archies, with our 'buses after them. They were coming up in every direction now. I shall never forget that sight as long as I live; it was a real battle in the air."

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There is no doubt that the Zeppelin raid on a number of counties during the night between Sunday and Monday last has come as a bit of a shock to most people. It has been a fairly common belief that on rainy nights there need be no anxiety regarding these prowlers of the night. When snowstorms are asserting themselves over the country it has been felt that security was doubly assured. This last raid, however, has lifted the curtain from this mistaken theory, and disclosed the fact that even a comparatively heavy snowstorm does not prevent them from getting across the North Sea, although there can be little doubt that the snow did very materially hinder the navigators in their endeavour to ascertain their whereabouts. As to the explanation of the possibility of an airship cruising during snowstorms, it is simple enough.

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Generally snow clouds hang fairly low, and by rising to an altitude well within their capacity the Zeps. are able to get clear of and well above the clouds. The other night

they were, as a matter of fact, probably cruising about comfortably in the clear cold starlit upper regions. The voyage itself does not therefore present any very great difficulties. Once over the English coast, however, the countryside below, entirely or partly covered in snow, would render identification of any points of objective extremely difficult. That this is the case seems clearly proved, if proof were needed, by the particulars available of the movements of the three raiders of Sunday last. Not only was no damage done to any building approaching a military character, but it was difficult, not to say impossible, to fathom what particular point might have been their objective. On some former occasions it was possible to surmise the objective although the shots were very wide of the mark. However, the raid is just one lesson more, and there now only remain two more forms for the Zeps. to demonstrate: their ability to visit these shores on moonlight nights, and to make daylight raids. Of these two, the latter is hardly likely to be attempted, but a moonlight raid is not only a possibility, it is a probability.

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From America comes the news that two of the largest American Aviation Companies have joined forces—the Curtiss Aeroplane and Motor Company and the Burgess Company. Under the new arrangement the Curtiss Company acquire the services of Mr. Starling Burgess and become the owners of the stock of the Burgess Company, although the latter will continue under its present operating organisation, and will still carry on the construction of the Burgess-Dunne seaplanes, with which this firm have had such distinct success in the past. The combine is claimed to result in the firms in question becoming the largest aeroplane manufacturing corporation in the world. The present output of the Curtiss and Burgess firms is stated by our New York contemporary, *Aerial Age*, to be ten machines per day, and it is expected that the capacity will shortly be considerably increased.

The new Thomas aeromotor, 135 h.p., has been undergoing some severe tests in the shops, including a very successful twenty hours run. Until the tests have resulted in a motor that is as nearly perfect as it is possible to make it the Thomas firm intend to stick to their resolve not to allow any of them to leave the works. When they do appear on the market, therefore, they may be expected to give a good account of themselves. Already one of the experimental engines has made good, it may be remembered, on the new military tractor, which some time ago developed a speed of over 100 m.p.h., piloted by Frank Burnside.

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Judging from some of the schemes mentioned at the tenth Annual Dinner of the Aero Club of America, held on January 12th, at the Hotel Belmont, New York, the next few months are to see a determined effort to restore America to her former position in the aviation world. M. Santos Dumont, who is to be one of the Ae.C.A. representatives at the forthcoming Pan-American Aeronautical Congress, at Santiago, Chile, said that a proposal had been made to him to inaugurate two aerial lines—one between Buenos Aires and Montevideo and the other from Rio de Janeiro to different places on its beautiful bay. He had been assured that the Governments of Argentina, Brazil and Uruguay would certainly give their support and foster these important projects.

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Rear-Admiral Peary outlined a scheme for the establishment of seaplane patrols throughout the whole coast of the United States. Private efforts and the valuable aid of the National Aeroplane Fund started by the Ae.C.A. have already resulted in the starting of several sections, and it is hoped that eventually the Government will lend its aid in order to ensure the scheme being properly organised and co-ordinated so as to render efficient service.

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PERSONALS.

UNDER the above heading will be published weekly particulars of a personal character relating to those who have fallen or have been wounded in the country's service, announcements of marriages and other items concerning members of the Flying Services and others well known in the world of aviation. We shall be pleased to receive for publication properly authenticated particulars suitable for this column.

Casualties.

Second Lieutenant ALBERT ERSKINE CARSON ARCHER, The Buffs (East Kent Regiment) and R.F.C., who has been killed whilst serving in France, was the eldest son of Mr. and Mrs. Thomas Archer, Beaufield, Stillorgan, Dublin, and was in his 20th year. Gazetted to the Buffs shortly after the outbreak of war, he was attached to the Royal Flying Corps, and for some months before going to the front was attached to a squadron taking part in the air defence of London. In a letter of condolence to Mrs. Archer, Major Hawker, V.C., D.S.O., wrote: "Your son is a great loss, both to the squadron and his country. Popular and cheerful, he was one of my very best pilots, and I greatly appreciated his pluck and resourcefulness in carrying out any duty entrusted to him. As you probably know, he was in command of one of my flights, and, though he was very young, I had intended that he should be promoted at the end of the month. His death was instantaneous."

Second Lieutenant TERENCE DONOUGH O'BRIEN, 16th Lancers, attached R.F.C., who was killed in Flanders on March 3rd, was the only son of Brigadier-General E. D. J. O'Brien, C.B., late 14th Hussars, Commanding the Western Mounted Brigade, and Mrs. O'Brien, The Rectory, Buxted, Sussex. He was 20 years old on February 28th.

Second Lieutenant CECIL HERBERT STILEMAN, 14th Batt. R.I. Fusiliers, attached Royal Flying Corps, killed in action on February 29th, was the elder son of Mr. and Mrs. Herbert I. Stileman, of Derwent House, Wimbledon Park. His age was 22. Educated at Repton School and Pembroke College, Cambridge, he obtained his commission in October, 1914, and had been attached to the R.F.C. since January last.

vice. It will be recalled that the Club is offering a 10,000 dollars Pan-American trophy for competition among representatives of the Western hemisphere. It is now raising a fund in order to provide substantial prizes for a competition for motors for aerial work; a splendid start being given to the fund by donations of one thousand dollars each from Messrs. Clarke Thompson, Santos Dumont and Courtlandt Field Bishop. A letter was read from the Secretary of the Navy, stating that the U.S. Naval authorities were giving considerable attention to the matter, and had one officer in Berlin, another in England and a third in France, watching developments.

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America is not, of course, the only one of the neutrals which is learning from the war. Holland, Sweden, Norway and Denmark are paying attention to the development of an aviation industry, and quite recently it has transpired that Portugal intends studying the question of military aviation. At least, I hear that the Portuguese Government has sent three officers to England to learn to fly, with a view, when back again in Portugal, of starting an aviation school there. These three officers have joined the Ruffy-Baumann school at Hendon, where they are to acquire the technique of the Caudrons.

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Hearty congratulations to Col. Lord Montagu, who was unable to take the Chair or be present at the meeting of the Aeronautical Institute on Tuesday. It was a lucky escape—for him. Lord Montagu should have a much more congenial atmosphere to speak in and audience to interest on Wednesday next week at the Constitutional Club, when he joins with Mr. Joynton-Hicks, M.P., in discussing the importance of British Supremacy in the Air.

ÆOLUS.

FLIGHT-LIEUTENANT HAROLD ROSHER, R.N., who was accidentally killed on February 27th at Dover whilst testing a machine, was the elder son of Mr. and Mrs. Frank Rosher, of Wimbledon. He was 22 years of age. The parents of the late lieutenant received the following telegram:—"The King and Queen deeply regret the loss you and the Navy have sustained by the death of your son in the service of his country. Their Majesties truly sympathise with you in your sorrow." The funeral took place at Dover on the 2nd inst., with full Naval honours, and a memorial service was held at St. James's, Piccadilly, on the 7th inst., the Rev. F. Menteath Jackson, R.N., coming specially from France to conduct. The congregation included the Hon. Sir Thomas Mackenzie, Miss Mackenzie, Mr. Clutha Mackenzie, Sir Henry and Lady Bax Ironside, Sir Richard Temple, Sir James Dunlop Smith, Sir Stuart Coats, Colonel B. Doyle, Mrs. Maurice Macmillan, the Rev. P. Morgan Watkins and Mr. J. W. Hornsby.

Marriages and to be Married.

On March 2nd, at St. Mary's Church, West Kensington, Lieut. BASIL E. P. GREGG, R.N.A.S., only son of the late Rev. E. P. Gregg, M.A., of Upton Rectory, Torquay, to WINIFRED STANDISH, second daughter of Capt. ANTHONY S. THOMSON, C.B., Elder Brother of Trinity House.

LEO FRANCIS PAGE, R.F.C., on February 22nd, at Buckland, Faringdon, by the Rev. Bernard Page, Chaplain to the Forces, assisted by the Rev. Charles Arthur, to VIOLET, daughter of Capt. and Mrs. LODER SYMONDS, Hinton Manor, Faringdon, Berks.

Major GEORGE B. STOPFORD, Royal Flying Corps, only son of Colonel J. G. B. Stopford, in London, on February 28th, to GLADYS EILEEN, daughter of the late FREDERICK BERKELEY and Mrs. BERKELEY, of London.

DESIGNING AND BUILDING A BIPLANE.

THE STORY OF A SUCCESSFUL EXPERIMENT.

By ROBERT P. GRIMMER.

[In the following story Mr. Grimmer has given a detailed summary of the ups and downs to which an experimenter in aviation has to be prepared to submit. He has adopted a very light style in handling his subject, and treats his firm's misfortunes in an almost Mark Tapley spirit, worthy of admiration. The mistakes made and the difficulties encountered should be helpful to new workers in the same direction, as suggesting what to avoid. Mr. Grimmer's views as to the comparative merits of twin-propeller and chain pusher machines as opposed to direct driven tractor machines are worth careful consideration, although it must not be taken that we necessarily are in agreement with all the author sets forth. Altogether the story is both amusing and instructive, and we heartily wish the Mann firm the success which Mr. Grimmer foretells in his concluding paragraph in connection with M.2 now under construction.—ED.]



The Mann biplane M.1, and some of those who helped to build her. Inset "the firm"; on the left Mr. R. P. Grimmer, and on the right Mr. R. F. Mann.

THE Mann Gun-Carrying Biplane is probably familiar enough to the average reader of "FLIGHT," but very few people seem to know the *raison d'être* of its existence. The general opinion would appear to be that the transmission was put in for a joke, or else was a misguided attempt to make the 'bus dissimilar to the ordinary type of fuselage machine. Nothing could possibly be more erroneous than these views, and I am now attempting to explain the exact reason why M.1 came into being.

The great majority of aeroplanes belong to the tractor type—that is, with the airscrew in front drawing the machine forward. The other type with the propeller behind are known as "pushers." Previous to the war, the "pusher" type had been greatly neglected, owing to the fact that its design and construction from a "performance" point of view presented great difficulties. The tail booms caused a certain amount of resistance, and there was always the possibility of their being broken by fragments of a damaged propeller. Further, there was the objection against the placing of the engine and tanks behind the crew, which, any way in theory, were liable to break loose and crush the pilot and passenger in the event of a bad landing. Whether this objection has always been substantiated by facts I am not prepared to say, but on paper the "engine-behind" machine certainly does look unhealthy.

Until the war broke out, all the best aeroplanes, without exception, were of the tractor biplane type, and the most successful of these were single-seaters or "scouts." Both the British and French Governments possessed a few "pushers," but it is very doubtful if the best of these had a speed much in excess of 65-70 miles per hour, with a climb of some 300 ft. per minute. The Service value of the "pusher" consists in the excellent view obtained by the crew and the ideal gun emplacement afforded by the projecting body or nacelle. But the "tractor" scored at that time (1914) by virtue of its superior speed and climb. If by a stroke of a magic wand the Allied Governments could have transformed their "tractors" into "pushers," retaining at the same time the superior performance of the former type, there is very little reason to doubt that this would have been done at the beginning of the war. It was not until some time afterwards that the device of firing through the tractor screw was introduced by Garros. This device has the great disadvantage that the gun cannot be properly aimed, as it is on a fixed mounting. The Huns were even worse off as regards "pushers" than ourselves, as they had pinned their faith entirely to the "performance tractor."

I have explained the virtues and vices of the "tractor" and "pusher" types; the one gave good performance, medium view and a bad gun platform, and the other bad performance, good view and a super-excellent gun platform. Mr. Mann and I had been connected with aviation in various capacities since its inception in 1908, and we had for some time previously recognised what we considered the disabilities of the contemporary types for Service work. The first really successful flying machine was the Wright, which in its

time (1908-09) put up some quite astonishing performances, including a double crossing of the Channel with an engine giving only approximately the same horse-power (20) as the Ford tin-can car! The great characteristic of the Wright was its twin geared-down propellers driven by chains. It is an undeniable fact that propellers of large pitch rotating slowly are more efficient than propellers of small pitch rotating at very high speeds. Propeller speeds of anything up to 1,000 r.p.m. are regarded as being slow, anything approaching 2,000 r.p.m. is very fast. High speed propellers have a very large percentage of "slip," and they lack the grip on the air of the slow speed variety. There are other objections as well, the chief being the tendency to disintegrate, owing to the terrific velocity of the tips, but this latter is worse in theory than in practice, though cases are reported from time to time. At one time the Wright machine was supreme, but as the designers made no real attempt to keep pace with the times by installing really high-power engines, their "twin-pusher" was in course of time completely eclipsed by single-propeller types, chiefly of the "tractor" variety. Mr. Mann and I always recognised the possibilities of the "twin-pusher," properly developed, and we had always wished to construct such a machine on modern lines. But in those days we never secured the weighty financial backing necessary for so great a project.

Just before the outbreak of the great war Mr. Mann and I were fortunate enough to secure the interest of Mr. W. H. Bonham-Carter in our project, with the result that we were able to commence construction in September, 1914, Mr. Mann having got out the rough designs in August. I must here pay a tribute to the magnanimity and the disinterested patriotism of Mr. Bonham-Carter, who at the time of writing has borne the greater part of the burden of financing our experimental work for a period of over eighteen months, and who at the outset had no guarantee whatever that he was backing the right horse.

M.1 was designed and built at great pressure in the hope that she might be used against the Huns early in 1915. Mature reflection inclines me to the view that we should have done better if we had advanced at a more leisurely pace. The design and construction of such an experimental machine was a very big contract, so big indeed that no established constructor would have risked his reputation by taking it on. Having no reputation as constructors to lose, we took the risk—there was a distinct risk, although we were unaware of it at the time—and boldly grasped the bull by the horns. The only building we had available for the purpose was a disused tin church 20 ft. by 40 ft., with a vestry that we converted into two offices. This building had the reputation of being haunted, and it certainly had been standing empty for many years before we got possession of it. A particularly gruesome story is told about this epoch, but the episode occurred so many years ago that it is impossible to verify it. Such was the reputation of the building where M.1 was built.

M.1 was a fuselage biplane with twin chain-driven propellers.

Mr. Mann, who was solely responsible for the design, was actuated by the desire to combine in one machine the virtues of the tractor and pusher without any of their vices. The wings were heavily cambered with the front edges sloped back partly for stability and partly to enable the Lewis automatic gun to be fired sideways. A 100 h.p. Anzani engine, hereafter sometimes known as the "Starfish," was mounted at the extreme prow, and the power was transmitted by means of a shaft and universal couplings to a gearbox behind the observer's seat. The gearbox was installed for the purpose of reversing one of the driving chains that emerged from it, and it weighed over 100 lbs. By the way, the reversing of one chain by any method otherwise than the Wright system of crossing it is a task sufficient to daunt the boldest designer, and is by far the biggest problem to be tackled in a chain-driven aeroplane. The two chains emerging from the gearbox ran on two sprockets attached to the propeller-shafts, which were supported by means of diamond-shaped brackets and tubes and wires at the sides of the inner pair of struts. The propellers, of course, revolved in opposite directions for the sake of stability.

On September 7th, 1914, we possessed a works indifferently equipped with tools, but with neither staff nor materials, and the designs of the machine itself only roughly worked out. Yet we only allowed ourselves three months in theory to get the "steam-roller"—as she was afterwards called—completed. In practice, and for the best of reasons, the construction represented five months of hard work, for it was not till the end of January, 1915, that the "steamroller" appeared at Hendon. I have never worked so hard in my life as during that five months, and the toil was so arduous, and the difficulties so numerous and complex, that the end of the period brought me a severe nervous breakdown, from which I did not finally recover until I took a month's holiday in the spring. The first difficulty we encountered was the problem of getting together an adequate staff. The next difficulty was the question of materials. The unprecedented demand for wood, fabric, sheet-steel, aluminium, tubing, nuts and bolts, wire strainers, &c., had created a veritable famine in these articles, and in some cases one had to wait months for delivery. Such material as we did get had mainly to be obtained by making personal visits to the various manufacturers and cadging—that is the only appropriate word—a sheet of steel here, a few lengths of tubing there, a dozen wire strainers, and so forth. Then there was the problem of drawings. It was well into October before we were able to get even one "stress merchant," and the middle of November before we could lay our hands on two more. In the meantime the foreman had to extemporise drawings of a kind on the back of sheets of emery paper, that being the time-honoured method employed in the early days of aviation in practically all shops.

The overtime worked during this period was something cruel; it was no uncommon thing to start work at 7 a.m. and to go on, with intervals for meals, till midnight. We frequently worked right through Friday night till noon on Saturday, and on these occasions it was not an uncommon thing for fitters to fall asleep at their vices until aroused by the foreman. On all our night shifts a pint of light ale was served out to each man at the firm's expense every two hours, and we found it very efficacious in keeping the men up to the mark. I should like here to pay a tribute to the energy and zeal of the average British workman, who has been so much decried by those who do not know him. We have never known the meaning of labour troubles, and it is my experience that in the aeroplane trade at least the average workman will deal with you as you deal by him. By far the most arduous task that fell to my personal lot was that of keeping a drawing office staff awake on the night shifts. I have sat up many a night dopping the "stress merchants" with

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London's Anti-Aircraft Defences.

IN a written answer to Mr. Chancellor, on March 3rd, Mr. Tennant stated that the military personnel added to the anti-aircraft defences are not in place of, but in addition to, the former naval personnel. Some redistribution has taken place, the naval personnel having been replaced at certain points by soldiers and transferred to other points. The military personnel working the anti-aircraft guns for the defence of London are specially qualified by training.

Lord Derby's Position.

IN the course of a debate in the House of Lords on March 3rd, Lord Derby said:—

"I will be accused of undertaking more than one man can possibly do if, in addition to my work at the War Office, I undertake work connected with the air service. My position with regard to the air service is very different from what some people assert. It is stated that I am responsible for the air defence of the United Kingdom. I am chairman of a Committee, but I have nothing whatever to do with the defence of the United Kingdom against aircraft. One newspaper, and a member of Parliament asserted that what is required is that the service for the defence of the United Kingdom

strong coffee at intervals, but in spite of this and other drastic methods more than once they were compelled to surrender to Morpheus. I recollect that on one occasion a "stress merchant" collapsed from his stool on to the floor at 3 a.m.

This particular man was a Sunday school teacher and a prominent church member, and had never been known to utter even the mildest "cuss word" on any other occasion, but when the wall was banged close to his head to arouse him, he responded with such a torrent of bad language in his sleep as shocked our most hardened fitters. We let him sleep on till breakfast, as he was obviously too muddled to distinguish "pi" from "cos," or "sine" from "tan."

With much labour the "steam-roller," was completed at the end of January, 1915, and duly transported to Hendon, permission having finally been obtained from the somewhat reluctant authorities.

It was erected early in February, and no sooner was she ready for her maiden flight when the pilot we had engaged to fly her discovered that he had more pressing business elsewhere. After some delay we made arrangements with Mr. W. R. Ding, and on Friday, February 19th, the machine was pushed out and the engine run preliminary to a flight. Strong as was my faith in the old "bus," I shivered with terror when the engine was started and the chains began to run round the sprockets and scream through their guides.

The chains, instead of running smoothly round the sprockets as all self-respecting chains should, progressed in a series of leaps and bounds and appeared to be animated with the desire of moving sideways as well as forward. A tinny clanging noise emanated from the transmission gear, and the wires in the propeller brackets vibrated until they resembled bird cages. The propellers gave one the impression that they wanted to come forward through the inter-plane struts. However, Ding said he would make a flight, and we all let go. The "steam-roller" ran along the ground, duly lifted amid a cloud of smoke from the engine, made a short straight flight and landed somewhat abruptly. It transpired that the pilot's seat had collapsed owing to the "wood butcher" responsible for its fixing having been called away to a prayer meeting and thus forgetting to finish his job. The following day, Saturday, Ding made another flight, partially across country, but this latter quite against his wish and inclination. On attempting to turn, he discovered that the steadying effect of the twin propellers was so great that the rudder had very little effect, and he was compelled to edge the "bus" round very gradually in order to get back. As the propellers did not suit the engine, and the throttle had jammed at two-thirds open, he had the unexpected pleasure of flying low over Collindale Avenue and only just clearing trees and houses. However, he got back all right, and had sufficient presence of mind left to fly hands off before he landed. A speed of 60 m.p.h. was attained, which was not so bad under the circumstances.

After a month spent in sundry alterations, chiefly to the transmission gear, with a view to steadying the jumping chains, a further flight of ten minutes was made on March 20th. A larger rudder and improved propellers had been designed, and this time the throttle was induced to go wide open. The improvement was quite marked, and a speed of 70 m.p.h. attained. An altitude of 1,000 ft. was reached without difficulty in a 30 m.p.h. wind. Unfortunately, however, one of the wires in the diamond supporting a propeller bracket came adrift, and the great weight of the "bus" caused her to burst a tyre on landing. Jumping chain trouble was still prevalent, and the tail skid was not satisfactory. A week was spent in further slight modifications.

* Friday is regarded by pilots, both aviation and marine, as a very unlucky day.

(To be concluded.)

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should have as its head a man who if anything goes wrong should be hanged. My sense of self-preservation makes me say that I have nothing whatever to do with the defence of this country against aircraft."

The Supply of Aeroplanes.

IN the House of Commons, on the 1st inst., Sir H. Dalziel said it had been officially stated that the Ministry of Munitions had the supply of aeroplanes in hand, and a member of the Government had said that it was being left to another Department. He would like to know whether we might trust to them giving an adequate supply.

Dr. Addison said the Ministry of Munitions was not and had never been responsible for the supply of aeroplanes. He had not seen an official announcement to the effect that it was responsible.

Restriction on Kite Flying.

AN amendment to the Defence of the Realm Act, published in the *London Gazette* of the 1st inst., extends Regulation (25) so as to include the sending up of balloons or the flying of kites which are of such a nature as to be capable of being used as a means of signalling.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British.

Admiralty, Feb. 29th.

"Flight Sub-Lieutenant Simms, R.N.A.S., to-day attacked and shot down a hostile aeroplane, which fell in flames a short distance in front of the Belgian lines, the combat and result being in full view of the Belgian soldiers in the trenches."

General Headquarters, Feb. 29th.

"This morning a German aeroplane, Albatros type, was brought down south of Merville behind our lines (near Hazebrouck). Another hostile aeroplane turned completely over, burst into flames, and fell behind the German lines in the vicinity of La Bassée."

"This afternoon a German captive balloon broke loose and drifted northwards at a great height, passing over our lines east of Bethune."

General Headquarters, March 1st.

"Yesterday there were 20 encounters in the air on our front. The enemy's losses were reported yesterday. One of our machines failed to return from a reconnaissance."

French.

Paris, March 1st. Afternoon.

"One of our aircraft crews in a double-engined aeroplane defeated an enemy aeroplane, which fell at La Bassée into the German trenches, and caught fire as it struck the ground."

Paris, March 2nd.

"The air squadron which was responsible for dropping forty-four bombs on the railway station at Chambly on the night of March 1st have since December 16th bombarded the railway station at Metz-Sablons five times, the railway station at Chambly twice, and the railway station at Arnaville once, which makes eight bombardments which it has effected in the intervening period."

Paris, March 2nd, Evening.

"In Champagne a German aeroplane cannonaded by our batteries near Suippes fell in flames in the enemy lines"

"North-east of St. Mihiel our long-range guns bombarded the station of Vigneulles. According to the reports of our observers two fires broke out, several trains were struck, and a locomotive burst"

"Last night one of our bombardment air squadrons dropped 44 bombs of all calibres on the station of Chambly, which appears to have sustained great damage. Notwithstanding a lively cannonade, our aeroplanes returned to our lines unharmed."

"During the day our aeroplanes also threw 40 bombs on the

station of Bensdorf and nine projectiles on the enemy establishment of Avricourt."

Paris, March 3rd. Evening.

"Adjutant Navarre yesterday, in the region of Douaumont, brought down a sixth German aeroplane of the Albatros type, which fell in our lines. The occupants, who were wounded, were taken prisoners."

Paris, March 4th. Evening.

"One of our aeroplanes last night dropped several bombs on the railway station of Conflans, where great activity prevailed."

Russian.

Petrograd, March 2nd.

"Numerous German aeroplanes threw bombs above the Riga sector, and bombs were also dropped from aeroplanes between Ixkul and Elisenhof, on the Dvina."

Belgian.

Havre, Feb. 29th.

"During the afternoon two German balloons of the Drachen (kite) type broke from their moorings on our front. One fell in the sea off La Panne, and the other near Coudekerque. The aeronauts were made prisoners."

German.

Berlin, March 1st.

"In aerial fights an English biplane was forced down near Menin, and the occupants were made prisoners."

"Two French biplanes were brought down by our anti-aircraft guns, one near Vezaponin (north-west of Soissons), the occupants of which were taken prisoner, and the other due west of Soissons. Apparently the occupants are dead."

"An aeroplane piloted by Lieutenant Kuehl, and carrying as observation officer Lieutenant of Reserve Faber, brought a military transport to a standstill on the Besancon-Jussey road by dropping bombs, and then successfully fought the transport men with their machine guns."

Berlin, March 2nd.

"North-west of Mitau a Russian aeroplane was beaten in an aerial fight, and fell into our hands with its occupants. Our airmen successfully attacked the railway station at Molodeczno."

Berlin, March 3rd.

"Our aviators dropped bombs in the vicinity of the fort of Verdun. To the east of Douai Lieutenant Immelmann shot down his ninth enemy aeroplane, namely, an English biplane. Of its two occupants, one is dead and the other seriously wounded."

From Other Sources.

A Reuter message from Petrograd, on February 29th, says:—"According to the latest reports, the Germans along the entire front are working hard to increase their strength in aircraft. A large number of aeroplanes have lately been brought from Germany, and the aerodromes of Libau, Kovno, Suvalki, and Radziviliszki have been considerably enlarged. An enormous quantity of projectiles and incendiary bombs are arriving daily, and German officers never cease telling their men that in the coming spring the German naval and aerial fleets will put forward a tremendous effort, and that the army must do the same, so that the Russian resistance may be finally crushed."

A denial has been issued by Messrs. T. Cook and Sons to the report in the *Berliner Tageblatt*, of February 16th, to the effect that during the recent air raids Austrian aeroplanes totally destroyed their tourist office in Milan. The office was absolutely untouched, and business is being carried on there as usual.

A semi-official review of the fighting before Verdun, issued in Paris on March 3rd, states:—

"All the evidence shows that the Verdun region was chosen by the Emperor's General Staff because the wooded region around Verdun was not very favourable for aerial reconnaissances. Nevertheless, we were not unaware of these preparations, although possibly we did not realise their great importance."

Writing to the *Times* from before Verdun on March 4th Lord Northcliffe says:—

"The Germans made a good many of the faults we made at Gallipoli. They announced that something large was pending by closing the Swiss frontier. The French were also fully warned by their own astute Intelligence Department. Their *avions* were not idle, and, if confirmation were needed, it was given by deserters, who, surmising the horrors that were to come, crept out of the trenches at night, lay down by the edge of the Meuse till the morning, and then gave themselves up, together with information that has since proved to be accurate. Things went wrong with the Germans in other ways. A Zeppelin that was to have blown up important railway junctions on the French line of communications was brought down at Révigny, and incidentally the inhabitants of

what remains of that much-bombarded town were avenged by the spectacle of the blazing dirigible crashing to the ground and the hoisting with their own petards of 30 Huns therein."

The *Daily Mail* correspondent at Salonica, writing under date February 29th, says:—

"The French squadron of seven aeroplanes which bombed the Turkish encampments round Smyrna returned to Salonica. They flew back over Mytilene and Imbros, where at a low altitude they saluted the British troops and came down at Mudros (Isle of Lemnos). After a rest the squadron continued its flight towards Salonica."

"On the way one of them through a motor defect fell in the sea, but the aeroplane and its occupants were rescued by a British destroyer. The other six machines arrived safely at Salonica, and came down simultaneously at the aerodrome at four o'clock this afternoon. Their flight was a remarkable one. The airmen crossed the whole of the Aegean Sea in twenty-four hours, covering a distance of 362 miles."

"Three German aircraft flew over Drama, Eastern Macedonia. French airmen gave chase and two of the Germans escaped. The third, it is reported this evening, was brought down."

An Exchange message from Athens dated Sunday says:—

"Yesterday morning a Zeppelin was reported making towards Salonica. The Allies' batteries forced it to turn back."

The Petrograd correspondent of the *Observer*, writing on March 4th, says:—

"Whether the Germans are actually planning an offensive on the Russian front in the spring is not clear. They are certainly methodically and swiftly continuing their preparations for a spring campaign, and taking every measure of precaution against possible Russian surprises."

"Take the northern front, for instance, where there is a curious tremor, as if in anticipation of a coming struggle. German aircraft are constantly appearing over Riga, Dvinsk and other points in the rear of the fighting line. Sometimes they drop bombs, but bombing is only an incident in their anxious and systematic aerial reconnaissance. The number of German aeroplanes has been increased

during the winter, and each division, at any rate on the Dvina, now has its own squadron. The type of machine has been improved. In the lower part of the body the aeroplane is armour-plated as a protection against shrapnel, more powerful motors are used, and each aeroplane is provided with a machine-gun and a larger supply of bombs. Zeppelins are used for scouting as well as aeroplanes."

In a message dated Sunday, the Dunkirk correspondent of the *Petit Journal* says a captive German kite balloon, apparently detached from its base by the fire of our artillery, passed over the town at a very low altitude.

Artillerymen who started in pursuit were able to seize the ropes and bring the balloon to the ground. Shortly afterwards two German observers who were on board jumped out and attempted to escape, but they were speedily recaptured. On the car was painted the inevitable Iron Cross. The balloon has been deflated and stored away.

Mr. A. Beaumont, writing to the *Daily Telegraph*, says that information has been received in Rome from Cairo to the effect that British aeroplanes have made excursions in all directions, and a seaplane which flew over Bia Sabi could discover not the slightest sign of any movement of troops in Palestine.

All work on the famous railway which the German papers announced to be a four-track line across the desert has been abandoned, and the tents which once formed a labour camp are deserted. The Turkish troops, after last month's skirmishes along the Anglo-Egyptian border, have been withdrawn, their presence being more urgently needed in the direction of Armenia.

Another report states that the Egyptian frontier in the direction

of Lybia is also quiet. An aeroplane which flew along the coast and went as far as the oasis of Shwva returned to Daboa with the news that no hostile army was anywhere in sight. The entire zone over which the British aviator had flown was clear of the enemy troops, both east and west. The Egyptian frontier is thus free from any imminent attack, and future defence becomes much simplified.

The *Daily Telegraph* correspondent in Paris, writing on Monday, said:—

"Jean Navarre has just brought down his sixth German aeroplane. He is just 20, and has already the French Military Cross, Military Medal, and the Legion of Honour, all won during the last twelve months. Jean Navarre, with his twin brother Pierre, is the eldest of eleven children of quiet, almost humble family, living near Lyons. The mother tells with pride, if with some alarm, about her two boys' venturesome spirit. When kept in at school at Lyons both used to escape by the roof and climb down the water-pipes. One of their amusements was to put up a tight-rope between two factory chimneys, 70 ft. above the ground, and do acrobatics on it.

"Jean became an aviator after the war. Pierre, to his disgust, was rejected because of narrow chest, but went to the mountains, and after a few weeks came back fit, was passed, and is now an almost full-fledged aviator.

"Madame Navarre repeats, trembling but proud, what her Jean has often told her. 'If I had the bad luck to come down in the German lines I have quite made up my mind what I shall do.' He is determined never to be taken alive, and his mother knows he will keep his word."

A KNIGHT-ERRANT OF THE AIR.

THE following little pen-picture of an aerial duel is taken from a letter which appeared in the *Times* on March 7th, written by an Oxford undergraduate now serving in the Royal Engineers:—

"This morning the air was full of German 'planes. I saw one flying overhead at a great height. Gun after gun picked it up, followed it across the sky with the deadly puff-balls, and then gave it up to the tender mercies of the next battery as it passed out of range. The Boche flew on quite undisturbed, making for the town about three miles back from here.

"Then I saw that one of our big fighting 'planes had risen, and, flying low over the trees, was hurrying in my direction as if trying to get as far away from the German as possible. So it seemed for the moment, and then I saw he was getting well behind the enemy and would rise to his height to attack him on the return journey. For some little time I watched the two machines—the one circling slowly over the town in the distance; the other now well away towards the firing line and rising rapidly, finally disappearing out of sight into a cloud-bank. The Boche 'plane stayed some little while unchallenged, then turned in a leisurely sort of way and started for home.

"The morning was ideal for flying, the air calm and very clear, with here and there a heavy cloud floating slowly across, but not threatening rain, and everything seemed to point for a safe return for the invader. He came towards me down wind at a great pace, making an almost impossible target for our 'Archies' (as the anti-aircraft guns are always called). They seemed to realise this, and hardly a shot followed him as he sped across the sky. He passed over my head and made away for home, skirting along the edge of a large dark cloud that stretched away towards the horizon. An old fellow in long waders was standing knee-deep in the ditch at the side of the road, slowly and thoughtfully lifting the mud up on to the banks on either side—'ditching,' I believe you call it. He saw me looking up at the now distant 'plane, and laughed. 'Looks as

if he owned the place,' he said; but, Gawd! if they did bring him down!'

"I glanced up again, and as I looked the 'plane made a sudden swerve away from the cloud-bank, and a larger and darker form seemed to spring out of the shadow, just as you have often seen a hunting spider dart out of its hiding place and seize some wretched insect. It was the fighting 'plane I had seen rising some time before.

"Almost before one could realise what was happening the machine-guns were firing, and the German was planing madly downwards for his life. At first I thought it was merely a ruse to help him shake off his big opponent, but the *vol plané* was turned into a spiral, and I knew that something was wrong. For a few seconds he came down steadily, and then seemed to lose all control. The radius of the spirals got less and less, and the descent more steep till the 'plane was pitching headlong downwards, whirling round and round as it fell, like a dancing Dervish dropping through space!

"In amongst the wonderfully varied mixture of the noises of the 'Front,' which at first seem so strange, but which one quickly comes to disregard, there came a new sound, a crash, which might possibly have meant the falling of a shell some distance away, but to me it brought back memories of a still, fine morning on the Port Meadow at Oxford. Do you remember? It was the first time that I saw Death.

"I looked up again at the spot where the short duel had taken place, but the sky seemed empty, absolutely innocent of 'planes! My 'spider of the air' had slipped back to his hiding-place again.

"Later. 'M'sieur has got back in his 'voiture' from —, where he has spent the day. He says that six civilians were killed this morning by a bomb dropped from a German aeroplane. I am beginning to realise that my 'spider of the air' was really a true Knight-Errant after all."

Night Landings in Aerodromes.

IN the House of Commons on the 28th ult. Major Hunt asked the Under-Secretary for War whether, in view of the danger and difficulty experienced by aeroplane pilots at night in finding the flares at present used at aerodromes, a recognisable form of search-light could be provided for aerodromes as well as the flares, so as to relieve pilots of the danger of being unable to find the places where a landing could be made in safety at night.

Mr. Tennant stated that in dealing with these matters the authorities were guided by reports received from those directly concerned, namely, the pilots. Continual experiments were being made to ascertain the best methods in lighting aeroplane landing grounds at night.

The Work of the Anti-Aircraft Corps.

REPLYING to a question in Parliament last week by Mr. Rowlands, Dr. Macnamara stated that Sir Percy Scott had written a letter to the First Lord of the Admiralty expressing his appreciation of the services rendered by the officers and men of the Anti-aircraft Corps. He added:—

Nothing would give us greater pleasure than to cause this communication to be published *in extenso*; but as it contains a record of the steps which have been taken under Sir Percy Scott's direction to improve the gunnery defences of London, it would clearly not be in the public interest to do so.

Nevertheless, I am sure the House would like to know that Sir Percy Scott, as a result of the five months' experience during his tenure of the command of the gunnery defences of London, takes occasion to speak in the highest terms of the manner in which the members of the Anti-Aircraft Corps—drawn as they are from all professions and spheres—have devoted themselves to their duties. He tells us that they have all—both officers and men—displayed an energetic eagerness to master the intricacies of their duties, and it gives him great pleasure to pay a tribute of appreciation to the valuable services they have rendered.

On behalf of the Board of Admiralty, I cordially associate myself with his commendation.

On Saturday H.M. the King inspected a section of the Royal Naval Air Service, with their anti-aircraft guns, in the garden of Buckingham Palace.

Models

ALL communications in connection with this section should be addressed to the Model Editor, "FLIGHT," 44, St. Martin's Lane, London, W.C. Correspondents are requested to write on one side of the paper only.

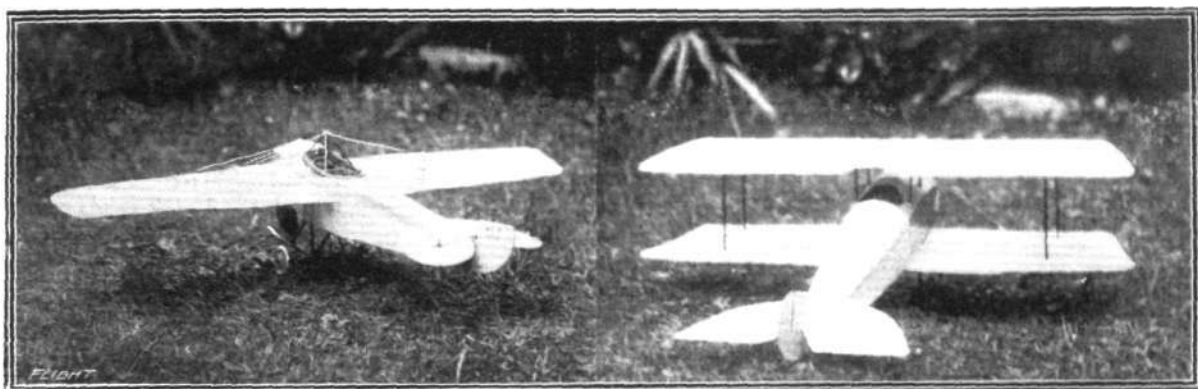
Two Scale Models.

FROM Mr. W. M. Bunce comes the accompanying photos. of models made from "FLIGHT" scale drawings.

"The two views of the biplane are those of a Sopwith scout, and the other view of a Nieuport monoplane.

"The general dimensions of the Sopwith scout were taken from the scale drawings of the first Sopwith scout published in 'FLIGHT' two years ago, but the model is altered to a certain extent to come

Pinney's models, as illustrated in 'FLIGHT' for February 10th, are, to my mind, about the minimum, and it is along such lines that I should like to see model aeroplaning develop. There seems no reason why illimitable pleasure should not be derived from such models, and those who worked with them would certainly accumulate a fund of useful experience which they should be able to turn to good account in connection with full-sized machines. As I have said above, it will not be easy or a suitable hobby for those who



TWO SCALE MODELS MADE BY MR. W. M. BUNCE FROM "FLIGHT" DRAWINGS.—On the left a Nieuport, and on the right a Sopwith tabloid.

into line with the later type (1914), and the planes are of rather less span.

"The Nieuport was built to the scale of the Nieuport seaplane (but fitted with land chassis), scale drawings of which were also published in 'FLIGHT.'

"The fuselages of the models are built up of hickory sticks, braced with thin wire. The front part is covered with aluminium and the back part with Pegamoid model fabric.

"The planes are of thin spruce wood ($\frac{3}{8}$ in. thick), covered with the above-mentioned fabric. Both machines have a span of 24 ins."

Scale Models v. Flying Sticks.

The following comments have been received from "Scale Model":—

"It is encouraging to see the two letters in recent issues from the two Scottish workers Mr. Pinney and Mr. Balden, and I shall hope to see before long another note from the former, giving some information regarding the results obtained with his tractor biplane, which is evidently beautifully constructed and promises well.

"Personally, I cannot agree with Mr. Balden as to allowing beginners to start on flying sticks. I am afraid it would only lead to the formation of bad habits. It would be far better to get them on to scale work at once, and their disappointments and experience would teach them far more than any temporary success with flying sticks. True, it would be a sore trial to their enthusiasm, and doubtless many would give up model aeroplaning in despair, but those who survived would be really conscientious workers, and the result should all be for the good of the cause.

"That it is not really hard to construct scale models is shown by the many excellent specimens of workmanship which have been illustrated in your pages recently. Of course the amount of work which has to be put in is ever so much more than in the case of the flying stick, but then the acromodellist should be able to take pride in his models, even as the model yachtsman, for instance, will take infinite pains to see that his little craft is spick and span.

"There is one point suggested by Mr. Balden's letter which should, I think, be kept in mind, i.e., that there should be no striving to keep the size of the models down too much.

"It is a fault to which model workers generally are much too prone; they appear, unconsciously very often, to regard the word 'model' as meaning as small as possible, and consequently they reduce the dimensions until they produce something which is much too fragile to do any serious work with. Here, again, they would do well to take a leaf out of the model yachtsman's book. Mr.

have neither energy nor enthusiasm, but those who want some useful recreation will go far before finding anything more suitable.

"If more attention is given to models of fairly large size it should open up possibilities for the development of suitable power plants either of the compressed air or petrol type. This would permit of the machines being built still more closely to the lines of their full-sized prototypes."

A Paulhan-Tatin Model.

Mr. Francis N. Benazzi writes as follows:—

"Some time ago, having decided to build a $\frac{1}{4}$ full size scale model, I settled, after some consideration, on the Paulhan-Tatin Torpedo, which seemed to me to offer many possibilities as a suitable prototype to copy, judging from the performances, which, it will be recalled, showed great efficiency. I set to work with the drawings as given in 'FLIGHT,' and although I got great assistance from them and from the description, I want to get further details regarding the construction and arrangement of the wing spars and also elevator and tail. If any reader could either help in this direction or indicate where I could get the desired information, I should be greatly obliged.

"I may add that as a constant reader of your excellent paper (to which I wish the success it so rightly deserves), I have been helped over many other difficulties, as well as deriving much knowledge and pleasure from its pages."

[If any of our readers are able to assist Mr. Benazzi, we shall be pleased to forward their communications.—Ed.]



UNAFFILIATED MODEL CLUBS DIARY AND REPORTS.

Club reports of chief work done are published monthly. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Finsbury Park and District (66, ELFORT ROAD, HIGHBURY, N.).

Monthly Report.—Last month showed great improvement in general work, much flying being done on all days with the exception of February 26th, when the ground was covered 8 ins. deep with snow, and the club adjourned for a snow-fight. Detail design has, in all cases, undergone marked improvement, and some very ingenious collapsing chassis have been evolved, while most machines seem to have taken unto themselves high aspect ratio wings, with a consequent increase of flying power. All machines in use this month have been tractor monos., and the following members have been out on all days: B. H. Barnard (heavy mono. a.r. 7-1), H. Mullins, F. E. Rayner, A. Richards, E. Coleman (the latter's was a light-weight mono., which seemed to fly in any wind), W. Harding, and S. Hex, all flying well. A duration competition will be held shortly at Finsbury Park.

French Honours for the R.F.C.

In the list of French Honours awarded to the Royal Flying Corps there was an unfortunate omission from the names of the recipients of the Croix de Guerre. This was

Sergeant WILFRID WATTS, R.F.C.

Armed Merchantmen and Aircraft.

In the memorandum published last week giving the Admiralty instructions governing the actions of British merchant vessels armed for self-defence, the following occurs:—

"2. Experience has shown that hostile submarines and aircraft have frequently attacked merchant vessels without warning. It is important, therefore, that craft of this description should not be allowed to approach to a short range at which a torpedo or bomb launched without notice would almost certainly take effect.

"British and Allied submarines and aircraft have orders not to approach merchant vessels. Consequently it may be presumed that any submarine or aircraft which deliberately approaches or pursues a merchant vessel does so with hostile intention. In such cases fire may be opened in self-defence, in order to prevent the hostile craft closing to a range at which resistance to a sudden attack with bomb or torpedo would be impossible."

German Aircraft and Neutral Ship.

ACCORDING to the *Norges Handels og Sjøfartstidende*, the steamer "Moderni," of Christiania, on its last voyage to England, had several bombs thrown at her from a German aeroplane, which disappeared to the west; no damage was sustained. The "Moderni" was flying the Norwegian flag, and the Norwegian colours were painted on its hull.

According to the Christiania correspondent of the *Morning Post* a Wolff Bureau telegram from Berlin states officially that the Norwegian steamer "Modemi" had not been shelled off the English coast by a German aeroplane, and that the only two tank steamers attacked by German aircraft were both known to be British. With reference to this statement, the *Norwegian Shipping Gazette* says that it merely printed a copy of the steamer's journal which had been sent from England, and that the captain is a reliable man.

German Aircraft in Holland.

HOLLAND last week secured a German biplane and a balloon. The former—B 610—was brought down by engine trouble at Bergharen, in the south of Holland. The pilot stated that he had come from Crefeld. He asked permission to reascend after attending to his machine, but he was interned.

The balloon—a large one—is reported to have come down at Koudekerke, near the frontier. As the car was vacant, it is presumed that the aeronauts escaped into Belgium.

A Zeppelin Burnt.

WHAT is presumed to have been the end of another Zeppelin is reported by the *Daily Mail* correspondent at Copenhagen. At 8 p.m. on February 27th, heavy explosions in the air were heard at several places in South Jutland (Denmark). The sounds came from Schleswig (Germany). "Trustworthy eye-witnesses state that great flames more than 3,000 ft. up were observed. They suggest that the explosions came from a Zeppelin which had caught fire. The fire suddenly ended and a burning mass was seen to fall."

More "Wrecked" Zeppelins.

REPORTS reached Amsterdam from Maastricht last week that two Zeppelins were wrecked in Belgium on February 21st. One is said to have fallen at Eghezee, apparently having been damaged at the front. In falling it struck a number of houses in the village, and injured eighteen children.

The scene of the second wreck was at Maisnault, in South Belgium, and the report states that the debris was packed on to a train and sent to Cologne, the wagons having chalked on the sides "Dirigible taken from the French Army." Anyone caught mentioning the loss of the two airships is heavily fined.

Protection from Zeppelin Raids.

IN the House of Commons on Tuesday, Mr. Ferens asked the Under-Secretary for War whether he was aware that on Sunday Zeppelins visited an important city on the East Coast, dropped twenty bombs, killed 17 people and wounded 15, and would he say

what steps he proposed to take for the protection of people from such raids.

Mr. Tennant: My right hon. friend put the question into my hands as I came in, and therefore I have not been able to consult my department as to any future steps which may be taken in this direction, and I am not at all certain that it would be desirable to convey information as to such steps even if I had been able to consult the department.

On behalf of the Government, I wish to say we sympathise very deeply and warmly with the relatives of those who have been killed and injured, and I hope that the figures given by my right hon. friend are in excess of the facts. The information that reaches me is not the same as that which my right hon. friend has conveyed.

Curtiss Offers to Train U.S. Naval Pilots.

IN connection with the National Aeroplane Fund organised by the Aero Club of America, a generous offer has just been made by the Curtiss Aeroplane Co. It offers a free course of training for one officer of the Naval Militia of each of 48 coast States, the training to be taken at either of the Curtiss schools at Newport News, San Diego or Buffalo. Last summer the Curtiss Co. presented a flying boat to the New York Naval Militia, besides training a pilot and mechanic.

New American Records.

THE Aero Club of America has homologated the altitude flights made by Lieut. R. C. Sanfly on a Curtiss waterplane at Pensacola, Flo., as American hydro-aeroplane height records, aviator alone. The figures are: November 30th, 1915, 11,156 ft.; December 4th, 11,975 ft.



PUBLICATIONS RECEIVED.

Aircraft in War and Peace. By Wm. A. Robson. London: Macmillan and Co., Ltd. Price 2s. 6d. net.

The Motor Car Red Book, 1916. Compiled by W. C. Bersey and W. V. Foucard. London: The Technical Publishing Co., Ltd., 1, Gough Square. Price 5s. net; post free 5s. 5d.

Zeppelins and Super-Zeppelins. By R. P. Hearne. London: John Lane. Price 2s. 6d. net.



Index and Title Page for Vol. VII.

The 8-page Index for Vol. VII of "FLIGHT" (January to December, 1915) is now ready, and can be had from the Publishers, 44, St. Martin's Lane, London, W.C., price 6d. per copy, post free.



IMPORTS AND EXPORTS, 1915-1916.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see "FLIGHT" for January 25th, 1912; for 1912 and 1913, see "FLIGHT" for January 17th, 1914; for 1914, see "FLIGHT" for January 15th, 1915; and for 1915, see "FLIGHT" for January 13th, 1916:—

	Imports.		Exports.		Re-Exportation	
	1915.	1916.	1915.	1916.	1915.	1916.
January ...	20,382	1,509	435	6,399	13,706	—
February	380	6,444	138	30,693	18,823	—
	20,762	7,953	573	37,092	32,529	—

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